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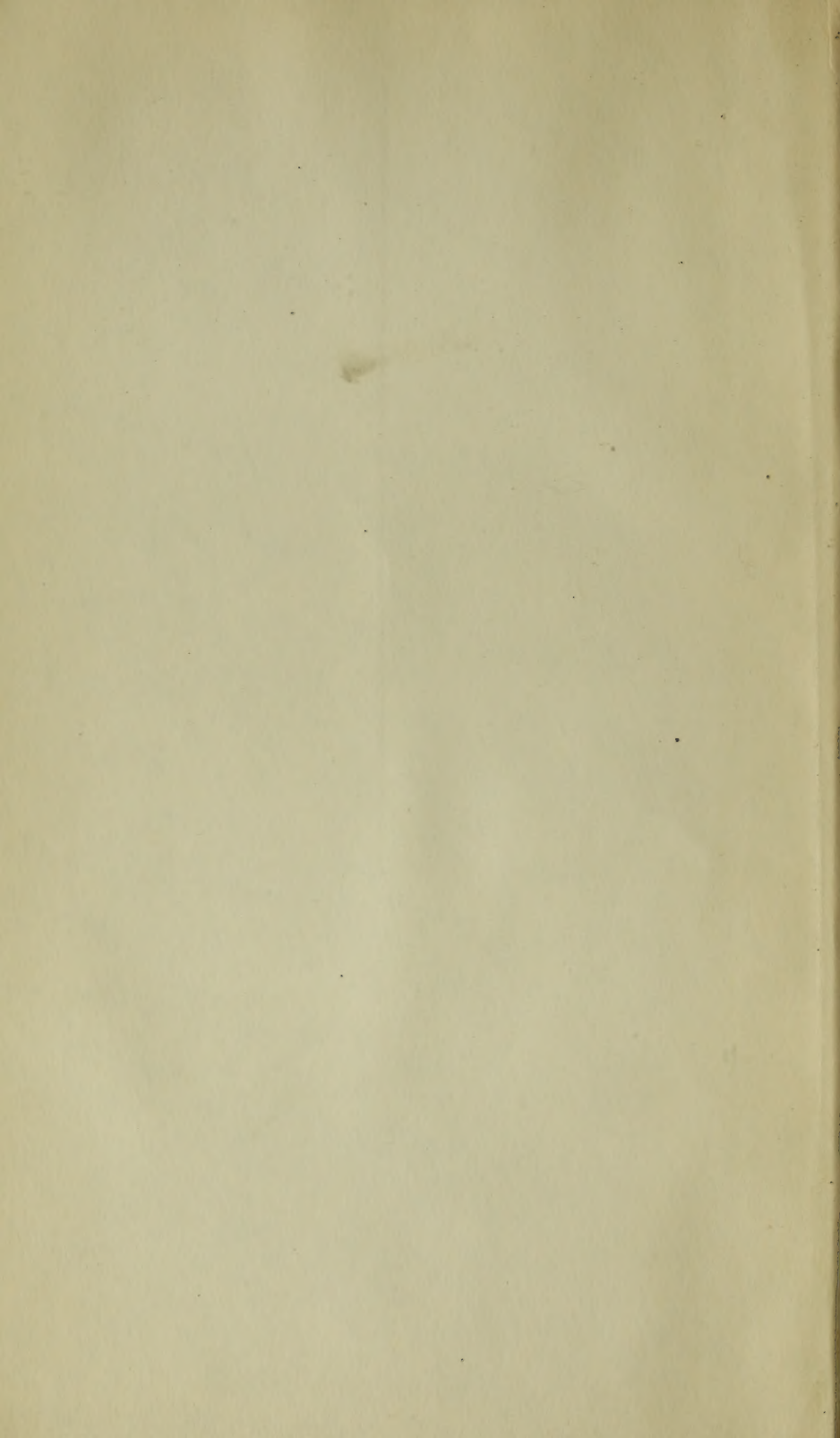














THE  
DENTAL COSMOS:

A

MONTHLY RECORD OF DENTAL SCIENCE.

Devoted to the Interests of the Profession.

EDITED BY  
JAMES W. WHITE, M.D., D.D.S.

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Observe, Compare, Reflect, Record.

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VOL. XXIX.

PHILADELPHIA:  
THE S. S. WHITE DENTAL MANUFACTURING CO.,  
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# LIST OF CONTRIBUTORS

TO

VOLUME XXIX.

---

Abbott, Frank, M.D.	New York, N. Y.
Allan, Geo. S., D.D.S.	New York, N. Y.
Baldwin, C. S. W., D.D.S.	New York, N. Y.
Barrett, W. H., D.D.S.	Paris, France.
Bennett, A. G., D.D.S.	Philadelphia, Pa.
Chupein, Theodore F., D.D.S.	Philadelphia, Pa.
Davenport, Isaac B., M. D. S., M.D.	Paris, France.
Davenport, J. L., D.D.S.	New York, N. Y.
Dean, G. S.	San Francisco, Cal.
Dodge, J. Smith, Jr., M. D., D.D.S.	New York, N. Y.
Gysi, Alfred, D.D.S.	Aarau, Switzerland.
Harlan, A. W., M.D.	Chicago, Ill.
How, W. Storer, D.D.S.	Philadelphia, Pa.
Ingersoll, T. Dwight	Erie, Pa.
Kells, C. Edmund, Jr., D.D.S.	New Orleans, La.
Knapp, J. Rollo	New Orleans, La.
Ottofy, Louis, D.D.S.	Chicago, Ill.
Palmer, S. B., M.D.S.	Syracuse, N. Y.
Shumway, T. D.	Boston, Mass.
Starr, E. T.	Philadelphia, Pa.
Stockwell, C. T.	Springfield, Mass.
Stowell, Sidney S., D.D.S.	Pittsfield, Mass.
Sudduth, W. Xavier, M.D., D.D.S.	Philadelphia, Pa.
Thompson, Alton Howard, D.D.S.	Topeka, Kansas.
Trueman, William H., D.D.S.	Philadelphia, Pa.
Truman, James, D.D.S.	Philadelphia, Pa.
Wright, C. M., D.D.S.	Cincinnati, Ohio.





# CONTENTS OF VOL. XXIX.

## ORIGINAL COMMUNICATIONS.

Anchors for Fillings in Teeth.....	91	Mode of Mounting the New Rich-	
Appliances for Regulating Teeth...	479	mond Tooth-Crown.....	747
Bacterio-Therapy.....	13	Modified Occlusion.....	477
Brief Discourse on Nutrition.....	303	Near Approach, Exposure, and De-	
Combination Metal Fillings.....	742	vitalization of the Dental Pulp...	541
Combination Movable Bridge-Plate	669	New Method of Crown-Setting...	641
Combination of Metals for Filling		New Mode of Root-Crowning.....	19
Teeth.....	733	Nutrition, a Brief Discourse on....	303
Crown and Bridge-Work.....	73, 349	On Some of the Pathological Con-	
Crown-Setting, New Method of....	641	ditions found in Dentine and	
Dental Caries Under the Microscope	217	Ivory.....	285
Dental Education, Literature, and		On the Use of the Matrix.....	486
Nomenclature.....	616	Regulating Teeth, Appliances for..	479
Dental Notation.....	440	Removal of the First Molar.....	673
Dental Sanitation.....	84	Richmond Tooth-Crown, Mode of	
Die-Plate and Hubs, Improved, for		Mounting the New.....	747
Shaping Metal Cap-Crowns.....	482	Root-Crowning, a New Mode of...	19
Enamel and Dentine—Thoughts on		Root-Filling, Immediate.....	234, 366
the New Theory Concerning their		Rule versus the Exception.....	739
Structure.....	362	Science and Dentistry: a Mono-	
Filling Teeth, Combination of Met-		graph.....	151
als for.....	733	Significance of the Natural Form	
First Molar, Removal of the.....	673	and Arrangement of the Dental	
Hereditv, Civilization, and the		Arches of Man, with a Consider-	
Teeth.....	637	ation of the Changes which Oc-	
Immediate Root-Filling.....	234, 366	cure as a Result of their Artificial	
Improved Die-Plate and Hubs for		Derangement by Filing or by the	
Shaping Metal Cap-Crowns.....	482	Extraction of Teeth.....	413
Iodoform and Arsenious Acid.....	678	Teeth of Rabbits.....	605
		Unknown Factor.....	145

## TRANSLATIONS.

Medicines for the Teeth to Keep them Good and Sound, and Cure their Diseases without Damage and Pains.....	1
--	---

## CLINICAL REPORTS.

Esophagotomy for Removal of an Artificial Denture.....	20
--	----

## CORRESPONDENCE.

Compromise, a, but not a Retreat... 160	The Miller Matrix..... 443
Dental Legislation in the Courts.... 163	

## PROCEEDINGS OF DENTAL SOCIETIES.

Alabama Dental Association.....	200	Meharry Medical College—School of Dentistry.....	276
American Academy of Dental Surgery of New Jersey.....	343	Minneapolis Dental Society.....	463
American Dental Association...463, 553, 644, 708, 763		Minnesota Board of Dental Examiners .....	467
American Dental Society of Europe	464	Minnesota Hospital College—Dental Department.....	277
American Medical Association—Resolution .....	460	Minnesota State Dental Association	724
Baltimore College of Dental Surgery.....	270	Mississippi Valley Dental Association.....	267
Boston Dental College.....	511	Missouri Dental College.....	274
California State Dental Association	663	Missouri State Dental Association..	344, 509
Central Dental Association of Northern New Jersey.....	268	National Association of Dental Examiners.....	465, 562
Central Illinois Dental Society.....	603	National Association of Dental Faculties .....	465, 657
Central University of Kentucky—Dental Department.....	512	National University—Dental Department.....	404
Chicago College of Dental Surgery	345	Nebraska State Dental Society..	134, 345
Chicago Dental Club.....	199, 510	New England Dental Society...664, 723	
Chicago Dental Society.....	342	New Hampshire Dental Society....	403, 509
Colorado State Dental Society.....	508	New Jersey State Dental Society... 465	
Connecticut Valley Dental Society 402, 466, 663, 790		New York College of Dentistry....	273
Dental Society of the State of New York.....	343	New York Odontological Society 22, 94, 236, 307, 367, 444, 487, 568, 659	
Eastern Illinois Dental Society..65, 134		Ninth International Medical Congress—Section XVIII. Dental and Oral Surgery.....	679, 750
Fifth District Dental Society, State of New York.....	268, 401, 663	North Carolina State Dental Association .....	345, 462
First District Dental Society, State of New York...41, 112, 166, 254, 325, 387, 461, 510, 593, 778		Northwestern Dental Association...	466
Florida State Dental Association... 568		Odontological Society of Pennsylvania.....	185, 335, 396, 790
Georgia State Dental Society...200, 344, 509		Odontological Society of Western Pennsylvania.....	199, 791
Harvard University—Dental Department.....	511	Ohio College of Dental Surgery... 270	
Howard University Dental College	276	Ohio State Dental Society.....	664
Illinois State Dental Society.....	269	Pennsylvania Association of Dental Surgeons.....	724
Indiana Dental College.....	275	Pennsylvania College of Dental Surgery.....	271
Indiana State Dental Association... 404		Pennsylvania Dental Society and Board of Examiners.....	403
International Dental Congress.....	201	Pennsylvania State Dental Society 465, 602	
Kansas City Dental College.....	277	Philadelphia Dental College.....	272
Kentucky State Dental Association	344		
Lake Erie Dental Association.....	459		
Louisiana State Dental Association 66, 267			
Massachusetts Board of Registration .....	664		
Massachusetts Dental Society...343, 401, 790			

Royal College of Dental Surgeons of Ontario.....	278	University of Maryland—Dental Department.....	201, 273
Seventh District Dental Society, State of New York.....	269	University of Michigan—Dental Department.....	511
Sixth District Dental Society, State of New York.....	462	University of Pennsylvania—Dental Alumni.....	402
South Carolina State Dental Association.....	402	University of Pennsylvania—Department of Dentistry.....	404
South Carolina State Dental Association and Board of Dental Examiners.....	269	University of Tennessee—Dental Department.....	277
Southern California Odontological Society.....	201	Vanderbilt University—Department of Dentistry.....	275
Southern Dakota Dental Society....	343	Vermont State Dental Society.....	342
Southern Dental Association...463, 646, 714,	771	Vermont State Dental Society and Board of Examiners.....	200
Southern Illinois Dental Society...65,	200	Virginia State Dental Association..	466, 723
St. Louis Dental Society.....	134	Western District Dental Society of Illinois.....	603
Susquehanna Dental Association... 344		Wisconsin State Dental Society....	467, 603, 790
Texas Dental Association.....	269		
University of Iowa—Dental Department.....	275		

## EDITORIAL.

Additional Pages.....	204	First District Dental Society, State of New York.....	726
Alabama Dental Law.....	468	Florida Dental Law.....	518
American Dental Association...405,	467	Georgia Dental Law—Correction...	665
American Medical Association, Resolution of the.....	467	Indiana Dental Law.....	471
"American System of Dentistry" ..	203	Massachusetts Dental Law.....	407
Analysis of State Dental Laws.....	514	Medical Congress and the Tariff Law .....	517
An Oversight.....	346	Nebraska Dental Law.....	472
Apology.....	664	Ninth International Medical Congress.....	278, 724
Arkansas Dental Law.....	469	North Carolina's Amended Dental Law.....	665
College Commencements.....	282	Odontological Society of Mexico...	665
Concession Not Conversion.....	202	Oldest Graduate.....	791
Connecticut Dental Law.....	406	Oregon Dental Law.....	473
Connecticut Valley Dental Society's Anniversary.....	792	Recent Dental Laws.....	346
Correction.....	792	Resolution of the American Medical Association .....	467
D.D.S.....	512	Richmond Crown and Bridge-Work Patents.....	204
Dental and Oral Surgery of the Ninth International Medical Congress.....	664	Secretaryship of the Dental Section	514
Dental Laws, Analysis of State.....	514	Southern and Virginia Dental Associations.....	514
Dental Legislation in the Courts...	203	Southern Dental Association.....	664
Dental Microscopy at the Medical Congress.....	468	Status of Dentists in the Medical Congress.....	516
Dental Section of the International Medical Congress.....	405	Supplemental Pages.....	791
Dental Section of the Medical Congress.....	135	Then and Now.....	68
Dentistry Not a Specialty of Medicine .....	66	The Outlook.....	69
Discontinuance of a Dental Journal	69	The Situation.....	137
Esthetics of Prosthetics.....	136	Tolerance.....	518
First District Dental Society.....	69	Two New Dental Journals.....	69
First District Dental Society's Anniversary.....	134, 791	Uniform Text-Books.....	346
		"Western Dental Journal".....	137



## BIBLIOGRAPHICAL.

American System of Dentistry.....	204, 666, 726	Nitrous Oxide: Its Properties, Methods of Administration, and Effects.....	793
Dental Caries and the Prevention of Dental Caries.....	796	Pamphlets Received.....	137, 410, 667, 730
Dental Pathology and Therapeutics.....	347	Physician's Visiting List.....	730
Dentist's Manual of Special Chemistry.....	794	Public Health: the Lomb Prize Essays.....	520
Differential Diagnosis.....	729	Rectal and Anal Surgery.....	796
Druitt's Surgeon's Vade-Mecum....	730	Report of the Commissioner of Education, 1884-5.....	410
Examination Chart.....	476	Study of the Histological Characters of the Periosteum and Periodental Membrane.....	793
Garretson's Works.....	72	System of Dental Surgery.....	409
Laboratory Manual of Chemistry, Medical and Pharmaceutical.....	795	Traité de Prothèse Buccale et de Mécanique Dentaire.....	520
Lessons in Gynecology.....	729	Transactions of the American Dental Association.....	137
Management of Pulpless Teeth.....	347		
Microscopic Structure of a Human Tooth.....	207		
Nineteenth Century Sense: The Paradox of Spiritualism.....	521		

## OBITUARY.

Ashton, Thomas, D.D.S.....	284	McDowell, Samuel A., D.D.S. 139,	208
Belisario, John B.....	208	Perry, William, M.D.....	138
Clements, S. T., L.D.S.....	668	Porter, Dr. J. P.....	796
Devore, J. H., M.D., D.D.S.....	667	Roberts, John, D.D.S.....	139
Eastlack, Dr. William C.....	411	Ulrey, Joel P., D.D.S.....	207
Easton, James M., D.D.S.....	284	Walker, Dr. J. R.....	521
Lewis, Dr. Frank G.....	731	Wayt, Dr. John G.....	283
McCalla, John, D.D.S.....	667	Williams, Israel, D.D.S.....	668

## PUBLISHER'S NOTICES.

The Dental Cosmos for 1887.....	72	The Dental Cosmos for 1888.....	797
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## PERISCOPE.

Anodyne for Odontalgia.....	537	Inflammation of Lips and Mouth Associated with Skin Disease....	531
Antiseptic Mouth-Wash.....	141, 537	Iodine in the Treatment of Glandular Swellings.....	140
Antiseptic Tooth-Powder.....	537	Medical Men and Dentists.....	537
Antrum, Diseases of the.....	525	Mouth, Boric Acid in Diseased Conditions of the.....	141
Boric Acid in Diseased Conditions of the Mouth.....	141	Mouth-Wash, Antiseptic.....	141, 537
Bridge-Work Flux.....	538	Necrosis of Jaw from Administration of Phosphorus.....	538
Caries in the Mastodon.....	141	Oidium Albicans.....	530
Control of Hemorrhage.....	536	Physician's Interests.....	142
Cure of a Lingual Ulcer by Galvanism.....	141	Prophylaxis of the Teeth.....	536
Cuspid Tooth Removed from the Left Orbit of a Child.....	533	Pyorrhea Alveolaris.....	532
Dentigerous Cyst.....	535	Skin Disease, Inflammation of Lips and Mouth Associated with.....	531
Diseases of the Antrum.....	525	Solvent for Sordes.....	141
Epilepsy from Carious Teeth.....	537	Specialist, a, on Specialism.....	139
Functions of the Tonsils.....	140	Tooth-Powder, Antiseptic.....	537
Hemorrhage, the Control of.....	536		
Human Teeth and Evolution.....	522		

HINTS AND QUERIES.....	142, 209, 347, 411, 538, 603, 731, 798
------------------------	--

THE INTERNATIONAL TOOTH-CROWN COMPANY'S SUITS.....	213, 803
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THE  
DENTAL COSMOS.

VOL. XXIX.

PHILADELPHIA, JANUARY, 1887.

No. 1.

TRANSLATIONS.

MEDICINES FOR THE TEETH TO KEEP THEM GOOD AND  
SOUND, AND CURE THEIR DISEASES WITHOUT  
DAMAGE AND PAINS.

[FRANKFURT: CHR. EGENOLFF. 1541.]

CONTENTS OF THIS LITTLE BOOK.

- Chapter I. When the Teeth Grow, and How Many a Man has.
- Chapter II. The Various Causes of Bad Teeth.
- Chapter III. How to assist Children that their Teeth may Grow easily.
- Chapter IV. Of Toothache.
- Chapter V. Of Hollow Teeth.
- Chapter VI. Of Teeth On Edge.
- Chapter VII. Of Yellow and Black Teeth.
- Chapter VIII. Of So-called Sleeping Teeth.
- Chapter IX. Of Loose Teeth.
- Chapter X. For Worms in the Teeth.
- Chapter XI. Ulceration, Bad Smell, and Decay of the Gums.
- Chapter XII. How to Draw Bad Teeth.
- Chapter XIII. How to Save the Teeth.

CHAPTER I.

WHEN THE TEETH GROW, AND HOW MANY A MAN HAS.

Firstly, one should observe that nature in bringing forth teeth works quite wonderfully. Some (very seldom) are born with teeth, like Marcus Curius, a famous Roman, who was called on account of it Dentatus. This was also the case with Cneus Papirius and a few others. Few have instead of teeth a whole bone.

But the teeth begin usually to grow in the seventh month after birth, and keep on growing in intervals of time until there are

thirty-two,—to some easier or more painful, sooner or later, than to others.

Teeth are also growing to some persons in their twentieth year, and to many, as Pliny says, in their eightieth year. To some they are falling out in old age, and new ones grow. This happened to Zanklen, a Samothracian, who got some teeth at the age of one hundred and four years. A son of Thimarcus Nicoclis had two lower jaws, and on each several teeth. And his brother never lost his, and did therefore use them up completely. Cases have been witnessed where teeth were found about the fauces, but these instances are so few that they may be counted among the wonders of nature.

## CHAPTER II.

### THE VARIOUS CAUSES OF BAD TEETH.

As teeth are given to man as an ornament, for use in eating, and for the pronounciation of words, it behooves us to keep them as much as possible intact, and avoid everything that might injure them. And whenever some mishap occurs to them (which is often the case) it is befitting to meet the same promptly, and counteract it before it permanently settles, as we should fight every evil in its beginning, and exhibit remedies at once. Therefore, care should be taken not only to see that no fragments of the victuals remain within them, but also to wash and cleanse them with pure water.

Indigestion is also by all means to be avoided, for it produces vapors, rising from the stomach, and injuring the teeth very materially.

Vomiting should likewise be avoided, as it causes considerable damage to the teeth; therefore, when one vomits, we are in the habit to ask if his teeth are on edge, or recommend him to bite on a bit of straw. But when vomiting does happen (as it is sometimes salutary to one's general constitution, or to the stomach in particular), the mouth should be immediately refreshed and washed with rose-water and vinegar, or with any other purifier.

All victuals that are detrimental to the teeth should be rejected, as dry figs, boiled honey, garlic, fat things, sour apples, wild pears, vinegar, milk, radishes; for they set, as it is said, the teeth on edge.

Besides, care should be taken not to bite on anything hard; for example, hard nut-kernels and the like,—things which in breaking up hurt the teeth, and cannot be broken without the teeth giving away; for much damage is thereby done them.

All slimy, sticky, and fat food should likewise be avoided, for it adheres to the teeth and causes much detriment.



In the same manner hot victuals must not be taken, for they burn the teeth, and can never be taken without hurt.

Beware, also, of overcold food or drink, for that injures also much the teeth, which we may find out by actual feeling, for we concede feeling to teeth as to other bones.

Likewise, beware of quicksilver, or salves in which there is quicksilver; and take particular care that, if it is put upon heated coals, its vapor does not enter the mouth and touch the teeth. In handling it do not put your fingers into the mouth, as certain empirics who rub red coin with it are in the habit of doing. Nor should we go to sleep soon after a heavy meal, for this will also damage the teeth.

### CHAPTER III.

#### HOW TO ASSIST CHILDREN THAT THEIR TEETH MAY GROW EASILY.

Above has been said that in every child the teeth commence usually to grow in the seventh month; but as with teething in children occasional illness and great pains are connected, the following remarks may be of utility:

At first children (to whom teething is painful) should often be bathed, and the gums after bathing gently rubbed with the finger, having been dipped in warm chicken, goose, or duck-fat, and pressed upon where the teeth are supposed to make their irruption, yet in a manner not to hurt them; also the brains of a hare may be taken and rubbed over the gums, or mixed with a little of the above-mentioned fat, rubbed on the cheeks, or outwardly spread upon them. After that one should take mallows, melilot, chamomile, cubebs, boiled in water, and therewith moisten and wash neck, head, and cheeks.

But when the teeth begin to appear and break through, take very fine, soft wool, from under the neck of a sheep, and chamomile or cubebs oil, nicely warmed; dip the wool in it, and lay it warm on the neck and lower jaws; a thing very good for children, and that makes the growing of the teeth easy.

It often happens that to children more than seven years of age, when the teeth begin to drop out, other teeth grow by the side of those which are about to fall out; therefore we should loosen the tooth about falling out from the gums, and move it often to and fro, until it can be taken out, and then push the new one every day toward the place where the first one was, until it sits there and fits in among the others; for if you neglect to attend to this, the old tooth will remain, become black, and the young one will be impeded from growing straight, and can no more be pushed to its right place.

## CHAPTER IV.

## OF TOOTHACHE.

What toothache or pains in the teeth are, knows no one better than he who has experienced them, and I think there are no greater pains than these.

Toothache may originate from a bad state or a destruction of blood-vessels entering the teeth.

Some count toothache among the hereditary diseases inherited from father and mother, and they are probably not wrong; for we see everywhere in our own time that children whose parents had been afflicted with it suffer from the same source.

But the stopping of the pains is, according to Johannes de Figo, principally effected in three different ways:

1. By a good regimen in eating and drinking, so that the one afflicted with toothache shall avoid things that soon decay, become putrid or of a bad odor,—as milk, old dough, bad-smelling cheese, fish; coarsely salted, dried, and smoked meat, and similar acrid victuals, as stated above.

2. By purifying the matter from which the pain arises, and which suffers a change, by bleeding or cupping, as Mesue writes; opening the cephalic vein, or those at the lips, the two others under the tongue, or the hepatic vein; placing cups under the shoulders, on the neck, on the chin; gently scoring the gums with a lancet, in order that the remaining blood may get out. Also, purging with *electuario rosato Mesue*, or pills of rhubarb, should be used; and if the pains originate from cold, use pills *de Fumo terre* and *sine quibus esse nolo*; all which are found at the apothecaries, and should be taken according to the advice of a skilled physician.

3. The pain is stopped by taking various medicines, either simple or compound, and are of two kinds,—either stopping the pains coming from heat, or those from cold; a distinction we cannot afford to lose sight of.

If the pains originate from hot things, the teeth will feel pleasant when one takes cold things in the mouth.

If the aches are caused by cold, they feel pleasant when one takes something hot in the mouth.

If the pain comes from cold, take in the mouth the following, either one, two, or three together, if they should fail singly: Take pellitory roots, boil them with wine, and hold warm in the mouth. One may also take pellitory and ginger, and boil with vinegar, and keep the same warm in the mouth. Or, take pepper and euphorbium; triturate them, adding honey, and lay the same on the teeth. Or, take asafetida triturated with mustard; this is also good. Or,

take a part of peach-kernel and half a part of pepper; triturate together, and lay it on the teeth. Or, take pellitory, pepper, ginger, lousewort, or orpine, an equal portion of each; triturate them together, and rub the gums therewith. Or, take onion-seed (henbane-seed), leek-seed, of each the same quantity; triturate; make with henbane-juice pills as large as half a hazelnut; lay one on coal; take a funnel, invert it over the heated pill, and let the smoke get to the ailing teeth. Or, take henbane-seed with a little sandarac, myrrh, ginger, and pellitory; triturate all together; put in a little bag of a finger's width, and hold over the aching tooth; this takes the pains away. Or, take pellitory, laid half a day in vinegar, and put it on the ailing tooth; this also stops the pains.

But if the pains come from hot things, use the following: Take the roots of the mullein, those which bear white flowers, and roses, barley, sumac, a handful of each; tormentil, henbane-seed, both triturated, and of each two drams; lettuce, two handfuls; nightshade, half a handful; boil them together in two quarts of rain-water and one-third of a quart of vinegar; let one-half boil away; filter it through a cloth, and hold it in the mouth on that side where the teeth hurt.

Anicenna says: Take the skin of a snake, boil it with vinegar, and hold it in the mouth, and that this is very good. Some take with vinegar pomegranate wine; also, the roots of henbane, with rose-oil and vinegar, chewed and held in the mouth, is good.

You may lay on the aching tooth *metridatum Nicolai*. Or, take vervain with the roots, boil them in wine, let them half boil away, and hold them warm in the mouth.

But if the toothache is connected with shooting pains, take pepper, incense, burnt beans; pulverize them; mix the white of an egg with them and make a plaster; spread it over a little cloth and put it inside on the cheek, on the side where the pains are.

Some apply also some medicines, as Mesue says, on the outside of the jaw, where the pains are the greatest, as cubebs, wild mallows, chamomile flowers, clover, fenugreek, linseed, porret-seed, corn-flag or lily-roots, etc., triturating them, and make thereof a plaster, or boil a part in vinegar or wine, and lay it on the jaw.

Others spread outwardly also the oils of chamomile, cubebs, rue, bitter almond-kernels, lilies, and peach-kernels. Or, take henbane-seed, alum, 4 drams of each; pepper, 3 drams; pellitory, 2 drams; triturate them finely, make little pills as large as beans, with vinegar, and whenever the tooth hurts take one and rub it on the tooth and gums where the pain is, or lay one in a little wine and vinegar; make it to dissolve, and put it in the mouth on the side where the teeth ache. Or take cloves, cinnamon-bark, calamus, of each an



equal portion; triturate it to very fine powder; pour a little burnt wine over it; let it stand; then lay with a little cloth upon the teeth.

Oppoponacum dissolved in vinegar and boiled, and then held in the mouth, is also good for the pains and decay of the teeth. Or, take castoreum, asafetida, storax, incense, round hollow-root, opium, pepper, henbane-seed, ginger, of each equal parts; triturate finely, and make it with honey to a salve, and if needed spread it upon the aching teeth. Or, take hyssop, boiled with honey and vinegar, and hold in the mouth; this will also stop the pains. Or frogs boiled in water and vinegar, and the broth held in the mouth.

But if the cheeks swell it is a sign of the stopping of the pains, for the matter that produces the pains leaves the blood-vessels that go in the teeth and the little skin that comes from the brain and surrounds the teeth, and goes to the outer fleshy parts, the gums and the cheeks, and swells them up, for which the following is very good: Take half a handful of violet leaves, 20 roses, 20 hops, a handful of barley; triturate a little; put to it ox-tongue and licorice, of each two ounces; boil it together with rain-water to half; filter through cloth, and put to it four ounces sirupi violarum; with this wash the mouth often; it is very helpful. Or garlic, rubbed and bound in the hands, stops toothache, according to Mesue. Or garlic boiled in wine, and one and a half drams of olibanum and a dram of myrrh, until it gets as thick as honey, quiets quickly the pains if you spread it on the tooth that is hurting. Or cockle that grows in rye, boiled with vinegar and held in the mouth, diminishes the pains. So also does henbane-root. Or the root of small burdock, boiled in wine and held in the mouth, stops the toothache. Caraway is also very good, particularly mixed with butter, outwardly laid on the cheeks. Or toast boiled with vinegar, wine or beer, and held in the mouth, quiets pain; the root of the large plantain, mustard, mulberry-tree root, the bark of the maple tree, cinquefoil, leaves of the mullein and others, are also very good, taking one, two, or three together. Also, the sediment of oil takes the pains away. Or garlic, fat pine-wood, olibanum, boiled with vinegar or beer, and held in the mouth, quiets the pain.

## CHAPTER V.

### OF HOLLOW TEETH.

Corrosio is a disease of the teeth when they get holes and hollows, happening mostly to the molar teeth, especially if they do not get cleaned after eating; for the victuals adhere, decay, produce bad, acrid fluids, that eat and etch into the teeth, and keep on doing so,

until the teeth are entirely destroyed, and one piece after another must, not without pain, drop off.

This condition, according to Mesue, is stopped and cured in three different ways: First, by purging, as above mentioned. Secondly, by destroying the matter that hollows them out and eats them away; this is done by boiling cockle, that grows in rye and wheat, with vinegar, and holding it in the mouth, or with vinegar in which capers-root with ginger is boiled. Thirdly, by getting rid of the hollow, which may be done in two ways. The first is to scratch and clean with a fine chisel, knife, file, or with any other instrument fit for it, the hollow and the parts attacked, and fill with gold-leaves, for the preservation of the remaining part of the tooth. The second is to use medicine, which is done by filling the teeth, after cleaning, with gall-nut and wild gallows-wood. Or, take henbane-seed mixed with gum storax, and make with it a smoke through a funnel into the hollow tooth. Or galbanum laid on hollow teeth mitigates the pains. The pains are also quieted if the hollow teeth are filled with oppoponacum.

Coral triturated and laid in the hollow teeth makes them fall out. Some say that those who every morning hold salt under the tongue until it dissolves, their teeth will not become hollow.

Against hollow teeth and pains, take pepper, pellitory, galbanum, storax, wild pollen, of each an equal share; triturate together and smear over the teeth. If the hollow teeth hurt, take the central part of gall-nut and lay it into the hollow; that quiets the pain. Against the eating away of teeth and their pains, take pepper, pellitory, boneset-milk, called in Latin *lac titimalli*; galbanum, storax, triturated together and spread over the teeth.

## CHAPTER VI.

### OF TEETH ON EDGE.

There is also an ailment of the teeth that is called in Latin *congelatio*, and we call it "teeth on edge," though according to the Latin it would be congelation or freezing; it has outward and inward causes, according to Johannes de Figo.

Outward causes are, if one takes into the mouth something sharp or sour, as sour-crout, crab-apples, wild pears, and other sour fruit. Inward causes are, if bitter or sour vapors arise in the stomach and mount to the mouth, teeth, and gums. Against the teeth on edge eat English walnuts, hazelnuts, almonds, or take them together and triturate and rub the teeth with it; also one of them may be taken alone. Or take portulaca, or the seed of it, and chew it. Or take warm bread, fried cheese, the yolk of an egg, which may be warm;

put to it a little salt; triturate together and lay them warm on the teeth. Some are eating laurel-berries against it—not a bad practice.

## CHAPTER VII.

### OF YELLOW AND BLACK TEETH.

Limositas is, when whitish, yellowish, or blackish slime settles on the lower part of the teeth and over the gums; some call it tartar.

Yellow or black teeth come from eating honey and other sweet, fat victuals; and whoever wishes to retain white teeth must abstain from honey, and not go to sleep immediately after having eaten much, especially of mushrooms or vegetable prepared with rye, wheat, or other fruits.

The natural appearance of the teeth is chiefly retained, or, if lost, brought back by medicines which dry up and cleanse, which have the power to rub away the uncleanness and to make clean, as pumice-stone, in Latin *spuma maris*, and common salt, etc.

A powder to make the teeth white: Take the root of wild galls-wood from the earth when it is white (frost or snow); triturate; make it with honey into little cakes; dry them in a stove that is not too hot; then take of them five drams; common salt and pumice-stone, of each one and a half drams; of cochineal two drams; aloes-wood, one dram; make of them a powder and rub the teeth with it; or silk burnt with common salt, and rubbed on the teeth, takes the uncleanness off.

Black teeth should be well scraped; then rubbed often, and smeared over with the following compound: One part roses, one-fourth part gall-nut, one part myrrh, well triturated; or, take well-burnt sulphur, pumice-stone, of each two drams; common salt, seven drams; triturate the whole, and rub the teeth therewith. Or, take unboiled egg-shells, from which the little skin inside is separated, and as much brick; triturate together very finely, and when you wish to use it put a little of it in a spoon, pour wine or vinegar upon it, and rub the teeth with it; then rinse the mouth with wine and pure water. Or, burn the stalks of rosemary to coal; triturate; bind in silk or any other stuff, and rub the teeth often with it; that makes them white and takes away the worms.

Another good powder against black teeth, and which also fastens the loose teeth and makes a good odor from the mouth, is the following: Take half an ounce of burnt alum, cream of tartar, red coral, of each two drams; pumice, two and a half drams; charcoal and rosemary, and cypress stalks burnt, sandal-wood, sarcocolla, of each one dram; triturate together, and rub the teeth therewith.



## CHAPTER VIII.

## OF SO-CALLED SLEEPING TEETH.

Dormitatio is an ailment of the teeth, in which they feel like a hand or foot when it is, as we say, asleep. This happens when one takes very cold things in the mouth, like snow, ice, or cold water. The following may be used: Take half a pound of good wine, rosemary, sage, chamomile flowers, of each half a handful; cloves, nutmeg, of each half a dram; boil them down to one-third, hold it warm in the mouth, and rinse it therewith.

Or, take cloves, ginger, nutmeg, pepper, of each a little; put it in a little bag of one finger's length; steep the same into burnt wine for half an hour; then lay it on the teeth that have this sleeping sensation.

## CHAPTER IX.

## OF LOOSE TEETH.

Dentium commotio is, when the teeth are loose and threaten to fall out prematurely, which happens either through negligence or weakness or disease of the gums, or through the separation of those substances that hold the teeth in their places; which happens when humors from the head drop down upon the gums or roots of the teeth and loosen them by their noxious action.

Or, diseases of the stomach may be the cause of loose teeth, when from it humors arise and damage the gums.

Against it medicine is used, as Mesue says, in a three-fold manner: The first is to purge the humors from the head, or the vapors which arise from the stomach, with their proper medicines, according to character or quantity of humors; for this purpose will be sufficient the pills and medicines which purify the head. The second, to dry up the humors and keep dry the vessels and flesh which hold the teeth with proper medicines, like incense, vinegar boiled with pellitory, onions, vinegar held in the mouth, lousewort, hellebore and the like, boiled in vinegar, which consume the humors.

The third way is the application of medicines which dry the gums and cleanse them of their humors, which is principally done by the chewing of mastic, and by boiling it with roses and pomegranate flowers, and washing and rinsing the mouth therewith.

But if loose teeth come from falling, striking, and from similar causes, bind them with silk or a gold thread to the solid and sound ones, if it be deemed necessary, and use soft and light victuals and medicines, which stop up and draw together, according to Cornelius Celsus, and take in the mouth wine wherein glowing gall-nuts have been extinguished. Or, take gall-nuts, one ounce;

myrrh, two ounces; the peel of pomegranate, cornflag root, of each one dram; cook together with vinegar; rinse the mouth and rub the gums with it. Or, laudanum with mastic mixed and placed on the gums. Or, take the ashes of burnt hartshorn, rub the teeth, or rinse the mouth with it; that will fasten the teeth; the same is accomplished also by scraped hartshorn. Or, olives boiled with water fasten the teeth; also, the washing of the mouth with olive-oil fastens and betters the hollow teeth. Or, take gall-nuts and the cups wherein the acorns grow, alum, peelings of pomegranate, an equal quantity of each; triturate and make a powder; put this powder in the mouth morning and evening, between the teeth and lips; this is very good to fasten the teeth. Or, take roses, unripe plums, unripe grapes; dry them in the sun; make a powder of them; mix with honey, and lay it on the loose teeth. Or, take laudanum and mastic pulverized, and both mixed with licium, and spread on the teeth, which makes them fast.

Some burn the gums on both sides a little with a hot iron; then they spread over the burnt parts honey, and rinse the mouth often with mead, and when it commences to fester they use medicines which dry and cool; but this burning is dangerous, and needs an expensive skilled master.

## CHAPTER X.

### FOR WORMS IN THE TEETH.

Against worms in the teeth, take henbane-seed, leek-seed, onion-seed; boil them together with vinegar, hold it in the mouth, and rinse well therewith; then take these seeds and triturate them together; pour fat grown about the kidneys over them, and make pills as large as beans; then take one and lay it on charcoal, set a funnel over it, and let the smoke go to the bad teeth; this will kill the worms. Or, take a little verdigris and twice as much honey; mix them together; spread them on the teeth. One may also lay powdered aloes on the teeth as a remedy for worms.

## CHAPTER XI.

### ULCERATION, BAD SMELL, AND DECAY OF THE GUMS.

If the gums are getting ulcers, we should press them nicely out with the fingers; and if we cannot do it so, we may take delicate, sharp hooks, suitable for the purpose, and scratch with them the ulcers, so that the impurity may get out; after that we should often rinse the mouth with vinegar and wine, wherein honey and sage have been boiled.

If the gums smell badly, take cinnamon, cloves, white incense, and rub the teeth with them.

But if they putrefy, take alum, half an ounce; honey, one ounce; mix together, and spread over the gums. Or, take earthleeks and vinegar with juice of licium, and hold them in the mouth; that strengthens the teeth, and takes away the putrefaction of the gums.

But if the putrefaction of gums is very extensive, we advise to purge first the body; then cleanse and press out all putrefaction with vinegar of squills and liticum until sound flesh grows; but if the putrefaction goes as deep as the roots of the teeth, and the cleaning hurts very much, quiet at first the pains with rose-oil, the white of an egg, or with milk; then burn away all putrefaction with glowing copper, iron, or gold; then lay on the burnt places butter with rose-oil. Apply to make the flesh grow *unguentum egyptiacum*, and let them heal up.

## CHAPTER XII.

### HOW TO DRAW BAD TEETH.

If the pains cannot be quieted in any way, in order not to produce damage to the other teeth or pains, you must take refuge in the last resort, *i. e.*, to draw out the bad teeth, which must be done by a person experienced in these things, as drawing out injudiciously is liable to do damage. Therefore, it should not be done when the pains are the greatest, but when they commence to get less; then shall the master free the bad teeth, with a fine instrument, from the gums, in order not to break away the gums with the teeth, and give rise to other ills besides the toothache. When now the gums are separated as much as possible from the tooth, it should be moved to and fro, so that it becomes quite loose, and then drawn carefully, not hastily, in order not to fracture, break, or displace the jaw, which occasionally happens to those without experience, especially when it is an upper tooth. There is also great danger to the eyes if any tooth be drawn carelessly.

But if the tooth is hollow, it should first be filled with lead, tin, silver, iron, or other proper substance, so that it shall not give away or break when it is taken hold of with the pincers.

It shall also be drawn straight, and not bent from one side to the other, so that the root will not break and the jaw be not damaged.

After the tooth has been extracted, feel carefully about if some little bone may not have been broken off, and, if you feel any, take it out with skill; if you cannot do that on account of the gums, cut them more away, and take out the splinters of the jaw by all means.

The sign by which you may judge whether the jaw be fractured or something of it broken off, is when the cavity wherefrom the tooth has been drawn bleeds more than usual, and the jaw swells so



much that one cannot open the mouth, and the cavity festers and swells.

But if no damage anywhere appears, hold cold vinegar, in which there has been boiled gall-nut and pomegranate flowers, in the mouth. But if still some pains and aches remain, take in the mouth rose-oil, in which mastic has been boiled.

Some, who have a dread to have their teeth extracted, burn the bad tooth in this manner: They take a fine, suitable iron; make it hot; put it into an iron tube, which they do not warm, but let be cold; the hot iron protrudes a little below; and with this they burn the tooth. But if the tooth is hollow they put the glowing iron into the hollow of the tooth. This burning is very good, and not dangerous, for it silences the pains and makes the tooth fall out by degrees in small pieces without pains.

Some take, instead of iron, a nut-kernel or a little olibanum; make it hot, and put it in the hollow of the tooth.

Or, take the fat of a green frog and smear it on the tooth; that will make the tooth to break in pieces and fall out without aches.

## CHAPTER XIII.

### HOW TO SAVE THE TEETH.

He who has good teeth shall beware of those things which we mentioned before in the second chapter. Then let him take every morning, as soon as he has risen, a coarse linen cloth; rub it over the teeth inwardly and outwardly; move it once or twice over the teeth, in this manner cleaning them. This rubbing strengthens the teeth and the gums, cleanses and prevents decay. After this let him take common salt and rub the teeth again with it. In this manner he will keep them white, fresh, fast, and sound.

Or, take salt and honey mixed in a pot; burn it to powder and rub the teeth with it.

Or, take myrrh and alum, finely powdered, and rub the teeth therewith.

Or, take burnt alum mixed with vinegar, and wash the mouth with it.

Or, take myrrh, boil in wine, and wash the mouth therewith; this strengthens the teeth; and, in order that the gums do not diminish, take care that no bad smell comes from them, and take away the humors.

And, finally, always after eating wash the mouth with wine or beer, in order to wash away all that might adhere to the teeth and make them decay, produce bad odor, and destroy them.

## ORIGINAL COMMUNICATIONS.

## BACTERIO-THERAPY.

BY A. W. HARLAN, M.D., CHICAGO, ILL.

(Read before the American Dental Association, at Niagara Falls, Thursday, August 5, 1886.)

THE germ theory of disease is so widely known and of such great importance that a meeting of a scientific body would hardly be complete in all its departments unless a paper presented dealt somewhat with micro-organisms as a factor in producing pathological conditions. In what specific manner germs operate to produce transitory, constitutional, organic, or local lesions, is not clearly understood. In many instances the claim has been advanced by investigators that a certain microbe, isolated from pus or other fluid secretion, excretion, or other point of growth, would produce, in a healthy subject, after cultivation in a sterilized nutrient medium, all the symptoms of the disease from whence the microbe was taken. It seems pretty well established that such is a fact, from analogy alone, even if we had not the results of experiments of a long line of careful and accurate investigations. While it may be doubted by some skeptics that this is true, still we have sufficient data presented to us by Miller, of Berlin, and Black, of Jacksonville, Ill., on the etiology of dental caries to substantiate the above. The labors of Pasteur in the investigation of the causes of disease in domestic animals may be cited as corroborative also. The discovery of the gonococcus in gonorrheal pus, the microbe of Asiatic cholera, the bacillus tuberculosis, bacilli of septicemia and malaria, actinomycosis in man and animals,—all tends to support the theory of the causation of disease by micro-organisms. As to the modes of causation of disease by bacteria, whether the result of their presence or of the soluble ferments secreted by them, the writer will express no positive opinion, although it is believed that bacteria by their presence do no harm other than feeding upon the tissues destroyed by the ferment secreted. Viewing bacteria and the ferments secreted by them as inimical to healthy living tissues, a ready and efficient means of destroying germs and neutralizing their products without injuring the parts to which they are applied, must be resorted to. This may be called Bacterio-Therapy. Sir Joseph Lister, in formulating his system of antiseptic surgery, began by using carbolyzed dressings and the spray to destroy germs and their spores and exclude them from entrance into wounds. It was found after a time that other therapeutic agents not so toxic or objectionable to smell or irritating were equally efficient. Since the beginning of the practice of antiseptic surgery, many antiseptics

and disinfectants have been proposed and used empirically in hospital and private practice. It is only recently that systematic experimentation has been undertaken to determine the relative value of antiseptics and disinfectants. Some surprising results were obtained. Many idols of the practitioners of "ye olden times" were rudely shattered, it is hoped never to be replaced on the pedestals of their practice. For the destruction of disease-germs or the neutralization of their excretions, antiseptics are not called for, except as after dressings in the care of wounds or other local lesions. This practice is believed to be indicated also in internal medication. This statement needs to be modified only in so far as a disinfectant may likewise be an antiseptic.

What are the conditions in oral surgery or the practice of dentistry calling for the use of disinfectants? Before indicating these conditions, it may appear better to define antiseptics and disinfectants. What is an antiseptic? An agent which will prevent decay; which will arrest it when once begun; in fact, preserve,—opposed to putrefaction. It need not be a disinfectant; it ought to be a microbicide. What is a disinfectant? An agent which will destroy foul odors by combining with them chemically; which will not coagulate the surface and leave the interior to putresce, but will cleanse and purify, and destroy infection. What are the conditions requiring the use of disinfectants? Before beginning an operation the hands, instruments, rubber dam, and all appliances used by the surgeon must be disinfected. Disinfectants are indicated in the treatment of engorged antra, in the roots of teeth or around them, in carious or necrosed bone, on the buccal, pharyngeal, and laryngeal mucous membrane; in fact, wherever a foul odor, infectious material, or decomposed matter is found, it is your duty to disinfect, destroy, remove, and purify. Cavities in living teeth need to be disinfected for the same reason that we disinfect a pocket in the gum, or an abscess at the apex of a root, because at these points will be found in nearly all cases a nest of germs. These minute organisms and their spores are found in teeth with and without living pulps, around the roots of the teeth, in the antrum, on the tongue, along the whole alimentary tract, including the oral cavity, and in the air, ever ready to seek a lodgment for propagating their species. They must be destroyed. Many antiseptics will not destroy germs without causing injury to living tissues. Others will not destroy spores; hence the necessity for using sporicides, microbicides, germicides, and disinfectants. In bacterio-therapy of dental surgery such disinfectants as are least obnoxious to taste or smell and least injurious to instruments, if equally potent, are to be preferred. Those drugs which are escharotic—though disinfectant—or poisonous in small quantities must give way



to remedies which are palatable and free from disagreeable fumes or stains. We now have a long list which will fulfill all these conditions. This paper deals with antiseptics and disinfectants from the standpoint of daily surgical practice, and only those remedies or drugs or methods are considered which can be utilized by the surgeon.

In choosing an antiseptic, the effect sought to be obtained by its use should be the governing thought. If you wish to seal a cavity in a tooth containing a living pulp, you ought not to use alcohol, permanganate of potassium, or Burnett's disinfecting liquid to moisten the pellet of cotton which you introduce, but you should use carbolic acid, aseptol, creasote, tereben, resorcin, iodol, iodoform, beta-naphthol, eugenol, pheno-resorcin, eucalyptol, sanitas oil, hydronaphthol, thymol, myrtol, menthol, boro-glyceride, or other antiseptic agents. If you wish to disinfect a foul root or its contents you would use Labarraque's solution, Condyl's fluid, aqueous solution of chloride of zinc, sanitas fluid No. 1, peroxide of hydrogen, solutions of aluminium, acetate or chloride, carbon disulphide, corrosive sublimate, biniodide of mercury, hypochlorite of calcium or sodium, iodine, resorcin, trichlorphenol, boracic or benzoic acid, or disinfectants which would permeate the whole mass of putrid matter and not coagulate the surface or substitute the odor of the drug for that which it was desired to disinfect. The object of chemical disinfection in dental surgery is, first, to remove foul odors; second, to destroy the agents of infection and disease in the parts to which the drug is applied; after which, if it is not germicidal, apply a germicide which will destroy the germs of putrefaction; third, dress the part antiseptically; exclude floating particles of the air, the debris of food and saliva, and nature will do the rest. Antiseptics which are very volatile cannot be used for dressing roots of teeth or wounds of the mouth or jaws. They should not be irritating or easily absorbed into the circulation, especially if toxic. Disinfectants which are disagreeable by their fumes, odors, or stains should be tabooed, as they are unnecessary. Bromine, silver nitrate, chlorine, and sulphur are such drugs. In order to destroy disease-germs or the germs of putrefaction it is necessary to use agents which will not only overwhelm them in their habitat, but which will prevent the development of their spores when removed from the field of observation and transferred to nutrient media. This is important, from the observed fact that some germs have been submerged in absolute alcohol, solutions of zinc chloride, five percent. solutions of carbolic acid, and to extremes of heat and cold, and yet have lived and fructified when restored to favorable surroundings. The micrococci of pus are, for instance, destroyed by aqueous solution of sulphuric acid in proportion of one part to sixteen hundred, while bacteria require a solution four times as power-

ful for their destruction. Some disinfectants act by virtue of their power to precipitate organic matters, thereby destroying the aliment of certain micro-organisms, which are hence starved to death. In disinfection it must be remembered that all infectious materials are not foul-smelling. The absence of odor, therefore, is not a sure test of complete disinfection. The prevalent belief, however, is in favor of such a supposition. The mere fact of a drug substituting its own odor is not always evidence of disinfection unless experiments have so proved it. Many of the so-called commercial antiseptics and disinfectants have recently been submitted to crucial tests, and have come out in very bad shape. In testing the various commercial disinfectants, Dr. Duggan, working with Dr. Geo. M. Sternberg, using broken-down beef-tea containing spores of bacillus subtilis and bacillus anthracis, obtained the following interesting table of results:

	Per cent. in which Active.	Per cent. in which Failed.
Little's soluble phenyl . . . . .	2	1
Labarraque's solution . . . . .	7	5
Liquor zinci chloridi (Squibb's) . . . . .	10	7
Feuchtwanger's disinfectant . . . . .	10	8
Phénol sodique . . . . .	15	10
Platt's chlorides . . . . .	20	15
Girondin disinfectant . . . . .	25	15
Williamson's sanitary fluid . . . . .	25	20
Bromo-chloralum . . . . .	25	20
Blackman's disinfectant . . . . .	30	20
Squibb's solution of impure carbolic acid (about 2½ per cent.) . . . . .	..	30
Burchardt's disinfectant . . . . .	..	50
Listerine . . . . .	..	50

—“Disinfectants and their Use, 1885,” W. O. Allison.

The relative value of the above substances is readily seen. A recent communication in the *Druggists' Circular* says: “Superheated steam, high temperatures, some of the mercury, silver, and copper salts, mineral acids, chlorine, bromine, and iodine are among the most powerful agents for destroying the infecting power of infectious material. They can destroy the spores of all microbes known to be the cause of disease. If we knew that every disease had its origin in a germ, as is now generally believed to be the case, then the words germicide, microbicide, and disinfectant would be synonymous. (Nascent oxygen or ozone should be added to the above.) \* \* \* Experience has shown that all good germicides are good disinfectants, that all good disinfectants can be used as antiseptics successfully (does not hold good), and all good antiseptics *usually* make good deodorants. The reverse, however, is not true. Substances may be de-

odorants and have neither antiseptic nor disinfecting power. They may be antiseptics and possess no disinfecting power. \* \* \* How are disinfectants tested? \* \* \* The agent to be studied is brought into contact with the germs in definite proportions and for a definite time. If, after such germs are removed from the solution, and planted in a favorable medium, under conditions favorable to their development, they fail to show signs of vitality, it is known that the disinfectant has done its work. If, however, they still live and multiply, it is a sure sign of failure. \* \* \* In a list of fifteen reputed disinfectants (previously quoted), only one was successful in two per cent. solutions, and it failed when diluted to one part in one hundred. Listerine, French phénol sodique, Burchardt's disinfectant, and Squibb's impure carbolic acid were so poor that they failed when added undiluted to an equal portion of the test solution of germs. The rest required from seven to thirty parts in one hundred to prove successful. \* \* \* What is the relative cash value of disinfectants?" The undermentioned table is based on the experiments of Miguel, whose first table was translated by the writer, and read at a meeting of the American Dental Association, at Niagara Falls, in August, 1883. He says: "To make ten quarts of a standard solution of equal disinfecting power we must use:

Full Cost.	Name.	No. of Grains.	Market Value.
\$0.00 $\frac{9}{10}$	Corrosive sublimate . . .	100	\$0.68 per lb.
.01 $\frac{1}{20}$	Chlorine . . . . .	375	.20 "
.01 $\frac{7}{20}$	Copper sulphate . . . . .	1350	.08 "
.02 $\frac{1}{2}$	Mercury biniodide . . . . .	33 $\frac{1}{2}$	.33 per oz.
.03 $\frac{1}{5}$	Mineral acids . . . . .	4500	.05 per lb.
.08	Bromine . . . . .	900	.06 "
.13 $\frac{1}{2}$	Ammonia gas . . . . .	2100	.45 per lb.
.14 $\frac{1}{2}$	Chloroform . . . . .	1200	.85 "
.15	Chromic acid . . . . .	300	.22 per oz.
.16 $\frac{1}{2}$	Potassium chlorate . . . . .	1950	.60 per lb.
.20	Silver iodide . . . . .	50	1.70 per oz.
.20 $\frac{3}{5}$	Picric acid . . . . .	1950	.75 per lb.
.21 $\frac{2}{5}$	Iodine . . . . .	375	4.00 "
.22 $\frac{1}{2}$	Silver nitrate . . . . .	125	.80 per oz.
.30 $\frac{1}{5}$	Potassium permanganate . . . . .	5300	.40 per lb.
.34 $\frac{1}{5}$	Carbolic acid . . . . .	4800	.50 "
.56	Benzoic acid . . . . .	1650	.15 per oz.
.69	Salicylic acid . . . . .	1500	.20 "
4.62 $\frac{9}{10}$	Osmic acid . . . . .	225	9.00 "
4.80	Thymic acid . . . . .	3000	.70 "
11.00	Anhydrous prussic acid . . . . .	600	8.80 "

"If we now compare the cost of the same germicide power of proprietary disinfectants, the contrast is quite startling. The following list is based upon the experiments of Sternberg, already cited.



The four that failed at fifty per cent. we can for convenience assume to be potent at seventy-five. One hundred grains of corrosive sublimate, costing at pound rates only nine-tenths of a cent, is our standard of comparison. This is dissolved in ten quarts of water. The prices are those of jobbing houses:

Full Cost.	Name.	Equivalents.	Market Price.
\$0.00 $\frac{9}{10}$	Corrosive sublimate . . .	100 grs.	68 cts. per lb.
13.00	Little's sol. phenyl . . .	20 qts.	65 cts. per qt.
35.00	{ 50 per cent. chlor. zinc, } Squibb's . . . }	100 "	35 "
35.00	{ Feuchtwanger's disinfectant . . . }	100 "	35 "
51.00	{ Phénol sodique (Hance) Bros. & White) . . . }	150 "	34 "
66.00	Platt's chlorides . . .	200 "	33 "
80.00	Girondin . . .	250 "	32 "
80.00	Williamson's sanitary fluid . . .	250 "	32 "
80.00	Bromo-chloralum . . .	250 "	32 "
96.00	Blackman's disinfectant . . .	300 "	32 "
112.50	{ Squibb's solution impure } carbolic acid . . . }	750 "	15 "
182.50	Burchardt's disinfectant . . .	750 "	23 "
255.00	Phénol sodique, French . . .	750 "	34 "
495.00	Listerine . . .	750 "	66 "

"Many of these are put up and sold in bulk. If so bought it would be necessary to reduce the figures a little. Most consumers are compelled to buy by the bottle, and the calculation is, therefore, based upon quarts. The retail price is from thirty to forty per cent. higher than here given. These comprise the pick commercial disinfectants in the market. \* \* \* When the best are so poor, what can we hope for from the hundreds of inferior ones palmed off upon a helpless public by ignorant charlatans, who neither know nor care what the value of their goods may be, provided they can be sold." Mr. A. Wynter Blythe, when speaking of the long array of worthless disinfectants at the London Health Exhibition, has well said: "Quackery takes a well-known common powder, labels it with a grand mystic name, selling bright copper at the price of gold."

From what has now been said you may see that real progress is being made in the warfare on disease-germs. It only remains for you in daily practice to make use of such antiseptics and disinfectants as will fulfill the definition of their respective indications. When it is stated that "seventeen pounds of the best crystals of carbolic acid would be required" to disinfect a room having a capacity of twelve cubic feet, you at once understand that it would be a dangerous atmosphere to live in. Let carbolic acid take its proper place as an anti-

septic, and use for disinfection an agent non-toxic, more potent, and less costly. Do not deceive yourselves by thinking that an agreeable perfume which masks a foul smell will prevent further decomposition, nor that the widely diffused odor of a drug heretofore believed to be a disinfectant will destroy micro-organisms or other infectious effluvia. It is *not* necessary to use antiseptics or disinfectants in the mouth or on the teeth which will be injurious to them or the mucous membrane. Therefore, acid disinfectants which are valuable for sanitary purposes are not to be commended for disinfection of wounds, dressing roots of teeth, or for use on mucous membranes.\*

## A NEW MODE OF ROOT-CROWNING.

BY C. S. W. BALDWIN, D.D.S., NEW YORK, N. Y.

IN producing this system of crowning teeth it has been my aim to overcome the objections to some of the methods now in vogue, viz., to keep the secretions of the mouth from between the teeth and backing, which soon become offensive. I thus prevent disagreeable odors instead of creating them, as is usual in all teeth backed with gold, whether for gold plates or crown-work. It is my design to ferrule (for I shall deal only with that class of crowns) the tooth with gold securely in such a manner as to have but little soldering, and consequently no investment of the piece, with its tedious accompaniment. I thus lessen the time usually required in setting crowns, and simplify the operation, so that it may be more generally adopted, and not be left to a few experts as at present.

The *modus operandi* is as follows: Select a Logan crown slightly shorter than would be used for setting without a ferrule. Counter-sink and prepare the inside of a root as for a Bonwill or any ordinary crown. If the outside of the root at the margin of the gum presents an irregular surface, then with Dr. Walter Starr's reducers shape it to such a size that the ferrule may be perfectly adapted to all parts. Take an impression, and produce in zinc or Babbitt's metal a die, to form which take a plaster model of the root-end, an eighth of an inch long, and shellac it to the point of a cone, which can be easily made by turning down a large spool, thus making the deep mold in sand into which the metal is poured. With this die strike the gold (22-carat, No. 30 gauge, is most commonly in use), laid upon soft lead. A few blows will produce a seamless and perfectly-fitting cover and ferrule. After trimming this to fit the festoon of the gum, drill in it from the lower side a hole for the pin of the crown, leaving the ragged edge produced by the drill. Then fill the

\* A portion of this paper appeared in the Transactions of the Illinois State Dental Society for 1886.

countersunk portion in the porcelain crown with oxyphosphate of zinc, and with the gold ferrule or cap in place, adjust the crown as you would wish it when completed. When the oxyphosphate is hard, you will find the ragged edge on the upper side of the cover will materially aid in removing and keeping the cap where it belongs. Unite the cover to the platinum pin in the crown with a small amount of soft solder,—tin and lead,—using muriate of zinc as a flux, a few blasts from the blowpipe being all the heat required. Then fill the root with oxyphosphate and firmly press to place. These caps might be made up at leisure, providing a few variations

FIG. 1.



FIG. 2.



FIG. 3.



for double and single rooted teeth. When a case is met that you cannot fit from your stock, choose a cap larger than the end of the root, and with a single clip of the shears cut to the center of the cap, and with pliers spring together, lapping the edges until the size required is obtained. Solder with gold solder by holding over the spirit-lamp, and proceed as before.

Fig. 1 shows a root, cover, and Logan crown ready to be assembled for the soldering of the crown-pin to the cover; Fig. 2 shows the cap cemented and soldered to the crown, and Fig. 3 the completely crowned root.

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## CLINICAL REPORTS.

### ESOPHAGOTOMY FOR REMOVAL OF AN ARTIFICIAL DENTURE.

REPORTED BY F. J. S. GORGAS, M.D., D.D.S.

On Sunday, November 14, 1886, George K. (white), aged thirty-two years, residing in Baltimore county, Md., while at dinner had the misfortune to partially swallow his artificial teeth, consisting of a rather narrow vulcanite plate for the upper jaw, to which were



attached three incisors, one lateral incisor having been lost from the plate. The denture was arrested in its passage downwards, producing intense pain and partially obstructing respiration, while deglutition, even of liquids, was rendered impossible. A physician was summoned, who detected the plate in the upper portion of the esophagus; but all efforts to remove it or force it into the stomach were futile. Sufficient opium to relieve the pain having been administered, on the following day (Monday) he was brought by his physician to the Infirmary of the University of Maryland, and placed under the care of Dr. L. McLane Tiffany, professor of surgery. On the same afternoon, the patient having been etherized, careful attempts to remove the plate were made, but it was so firmly impacted in the upper portion of the esophagus that all efforts for its removal failed. On Tuesday, in the presence of the medical and dental classes, the patient was again etherized and efforts made to remove the plate through the mouth, but without success.

The patient lying on his back, with his face turned to the right, so as to render the tissues of the left side of the neck tense, Prof. Tiffany made an incision about four inches in length through the integument over the depression between the trachea and the sternomastoid muscle. The anterior jugular vein was cut and ligated, and the incision extended from opposite the upper border of the thyroid cartilage nearly as low as the sterno-clavicular articulation. The platysma myoides muscle and the cervical fascia were then divided. The edges of the wound being held apart with retractors, the omohyoid muscle was drawn outwards, and the sternohyoid and sternothyroid muscles inwards. The carotid sheath, with the contained vessels, was exposed and carefully drawn outwards, while the thyroid gland was separated as far as necessary, and drawn inwards. The larynx and trachea were drawn somewhat forward, and the finger passed behind, where the foreign body could be distinctly felt through the esophagean wall.

Care being taken to avoid the recurrent laryngeal nerve, an incision large enough to admit the finger was made into the esophagus, through which the exact position of the set of teeth was ascertained. Forceps were then introduced, and the plate removed intact. The wound, after being thoroughly cleansed, was dressed with antiseptic gauze and absorbent cotton, no sutures being employed. On the following Thursday the patient was walking about his room, having a normal temperature and pulse. He was fed by means of a stomach-tube for six days, after which he was able to swallow liquid food with little or no pain, and the external wound had nearly closed.

## PROCEEDINGS OF DENTAL SOCIETIES.

### NEW YORK ODONTOLOGICAL SOCIETY.

THE New York Odontological Society held its regular meeting, Tuesday evening, October 12, 1886, in the parlors of the Academy of Medicine, No. 12 West Thirty-first street.

The vice-president, Dr. J. Morgan Howe, in the chair.

The President invited visiting dentists not members of the society to participate in the discussions, and present incidents of office practice.

Dr. W. H. Dwinelle. Owing to a lack of time at the last meeting, Dr. Weld's contribution to the society was not referred to in a proper manner. Dr. Weld not only contributed the learned article which he read, but made a very handsome present to the society,—one which I think of great value. It is important that the experiments he mentioned, and which he has tabulated and put in this frame for future reference, should be preserved intact; and I move that not only the thanks of the society be extended to Dr. Weld for this contribution of his labor and its expression of good feeling towards our society, but that this valuable case of specimens take its place among the archives of our society and be preserved in the interest of science for all coming time.

Dr. Dwinelle's motion was carried unanimously.

### INCIDENTS OF OFFICE PRACTICE.

Dr. S. G. Perry. The hand-piece attachment which I exhibited before this society last spring was attached to the arm of the Bonwill engine. As you see it here, it is a part of an engine which has been made by Mr. Weber. Any of you who have studied the Bonwill arm will have observed that Dr. Bonwill ingeniously secures uniformity of tension of the cord in different positions of the arm by the device of a double joint. If he allowed the cord to run over the same center that the joint swings upon, its tension would vary much in different positions. Mr. Weber secures absolute uniformity of tension by the use of what is known in mechanics as an "idler." This is an extra pulley which holds the cord in such a position that in moving the arm the cord tightens on one side of one of the main pulleys as much as it loosens on the other side of the other pulley. Another way in which Mr. Weber secures the same result is by winding the cord completely around one of the pulleys at each joint. As you see, he has here combined these two methods, winding the cord around one of the pulleys at the "shoulder" joint, and using the "idler" at the "elbow" joint.

Either of these methods, or a combination of them, gives mathematical compensation to the cords. The simplicity of this device, which is the result of Mr. Weber's ingenuity, is another illustration of the adoption of simple means to an end after the trial of those more complicated. Another marked advantage in this engine is the simple device by which the tension of the cord is increased or lessened by simply turning a thumb-screw. By its use the engine is easily fitted for light or heavy work. From the hand-piece one of the bearings has been removed, so that the engine as a whole is remarkably light-running and noiseless.

I desire to call the attention of the society to a change which I had made in the Bonwill mechanical mallet. It consists in constructing the frame that holds the wheel so that the cord can be put on or off without trouble. This makes it possible to change the hand-piece for the mallet in about five seconds of time. Mr. Weber has devised another desirable change in this matter, by means of which the force of the blow is easily adjusted. It consists of a collar on the shaft of the mallet having a projecting tooth which engages in a series of notches, and is held to its place by a hidden spiral spring. This collar being turned to the right or left increases or decreases the force of the mallet blow, and being held to its place by the spring, there is no chance of loosening, as was sometimes the case with the jam-nut which I formerly used. These changes add somewhat to the convenience of using this most invaluable instrument.

I desire still further to call attention to the manner in which I have the hand-piece, as well as the mallet, covered by a thin casing of hard rubber. It has a much more smooth and pleasant feeling than the roughened metal, and yet it is a material that does not readily slip in the hand. After several years' use I am convinced of its advantages.

The President. Gentlemen, I know that you are all more or less impatient, the uppermost subject in every one's mind being the new operation of implanting teeth. Praise has not been wanting in the past for the man or men who have been able to make more blades of grass grow in the ground than grew before. What shall we say, then, of the man who is able to make more teeth grow in the mouth? Dr. Younger has very generously, in expenditure of time and labor, shown his operations, and I think I speak the sentiments of every one who has become even slightly acquainted with his generosity in this respect when I say that we are very grateful to him. He has kindly consented to come before us this evening to read a paper on the subject, and show us some results of his operations. I have



the pleasure, gentlemen, of introducing Dr. W. J. Younger, of San Francisco.

Dr. Wm. J. Younger. Before reading the little paper I have scratched off, I would state that a patient and friend of mine is very fortunately present this evening, in whose mouth I implanted a tooth about two months ago, and also replanted two others that had been nearly forced out of the alveolus by disease and tartar,—one a superior central and the other a right superior lateral. They had been thrown out about one-third of their length, so that when the lady closed her mouth these two teeth projected over the lower lip. I removed them and treated them as I do other teeth; drilled sockets in a new direction, and restored them to the jaw. She has very kindly consented to come before you and allow you to examine those three teeth.

Dr. N. W. Kingsley. Let me ask the doctor a question. The case which he is about to show is one where two natural teeth had become elongated from some diseased condition, and he extracted them, deepened the sockets, and restored the same teeth?

Dr. Younger. Yes; that is true of the central and lateral. The bicuspid which I implanted was a tooth that had originally grown in another mouth. The space had been without a bicuspid five or six years.

Dr. Perry. How long had the bicuspid which you implanted been out of the mouth, and what condition was it in before it was extracted?

Dr. Younger. I do not know what mouth it came from, but it had been extracted, perhaps, five or six months. The tooth was inserted and was not ligatured.

The President appointed as a committee to examine the implanted and replanted teeth Drs. Jarvie, Lord, Atkinson, Gifford, and Allan.

The President thanked Mrs. S. in the name of the society for her kindness in permitting her mouth to be examined in the interest of science.

Dr. W. H. Atkinson. I do not think that we realize to whom we owe our greatest obligations, as dentists and professional men, in regard to our understanding of what reproduction of tissue is. Personally, I owe more to ladies for my advancement than to all other means of instruction. I think we owe this lady a very warm expression of our gratitude for the effort that she has made to bless mankind, in subjecting herself to a not very pleasant ordeal; although I know we are all gentlemen, and ought to be very accept-

able to ladies; and a man who is not acceptable to ladies had better not go into dentistry with any idea of success. We owe it to this lady to express in some definite shape that we do appreciate her kindness in enabling us to witness that which we have at best doubted. I lay some claim to being faithful, yet I am somewhat of an infidel in regard to things which men claim to have accomplished in such directions, and when I heard of that certificate that came from California, that such and such implanted teeth were as firm as a rock, I said they had better not say as firm as a rock, but as firm as the other teeth. I have tried those in this lady's mouth, and I cannot see that they move any more than the adjoining teeth that have not been disturbed in their positions, and although it is but a very short time since they were inserted, I would not have known that those teeth had ever been out of the mouth by the best scrutiny I was able to give them. That certainly is worthy of our consideration, and it ought to make Dr. Younger feel very comfortable; for I did not give him credit for understanding histology well enough to be confident that his judgment was worth anything as to how tissues are united; and I do not yet. But I think we should at least give him the opportunity to teach us something that we may in time reduce to a demonstration. I would not know that the pulps were out of those teeth by the examination I made. Possibly, if we had an electric light and proper arrangements for examination, we might detect the difference between the teeth that have living pulps in them and those that have *not*. I am not a member of this society, but I am a member of the human family, and I have an interest in all that interests human beings. I have cast my die to go with the dentists as against all other categories of men. I would rather take dentists than any other class of men to stand up and be thoroughly examined, without any fear of what the ultimate judgment should be with regard to what they were doing and are able to do.

Last Saturday I was invited to Dr. Woodward's office, where three patients were expected for the exhibition of this process of implantation. Dr. Younger was a little tardy, and Dr. Woodward asked me if I could not do something. I looked around and saw a dozen real ripe minds, and I said that wherever you can get as many American dentists together as there are here they can do anything that any human being can do if they will pool their issues. We had to use such instruments as we found at hand; but although it was the first time I had ever performed the operation, the superior central implanted did not need any ligature, the adaptation being so complete that we drove it in, and it seemed firm at once.

Whenever any man brings us anything we do not tell him he is a

fool, and that what he claims is impossible. We say, "Let us see." So, as I said when I first heard of Dr. Younger's method, give him free opportunity to get his case before the court and do not prejudge the matter.

Dr. Dwinelle. One word in supplementing what Dr. Atkinson has said. I think it would be interesting to have the case operated on by Dr. Atkinson more clearly stated. The young man had a left central incisor broken off, the root remaining in position, with a large ulcer upon its extremity. The tooth to be inserted had a much larger root than the one Dr. Atkinson extracted; but nevertheless he went forward boldly, as he always does when he knows he is in the right. He introduced a drill, reamers, burs, etc., and enlarged the socket to an extent that must have eradicated every vestige of the walls of the ulcerated and dead socket. He inserted the tooth in a very handsome manner,—so much so that Dr. Younger had better look out for his laurels, to say the least. I saw the operation two days afterwards, and so far it was very successful. The interesting part of the operation was, that he reamed out the ulcerated socket, removed the diseased parts, and introduced a much larger root than the one removed. It is in good order, I understand, to-day.

The President. Dr. Younger will now have the kindness to read the paper he has prepared.

Wm. J. Younger, M.D., of San Francisco, Cal., read a paper entitled

#### IMPLANTATION OF TEETH.

Gentlemen: By implantation I mean that operation which involves the forming of a socket in the jaw, either where one has been obliterated by time or where the part is virgin,—never having borne a tooth,—and into which socket a tooth is planted. I have chosen this term not only on account of its fitting etymology, but to distinguish it from the old and well-known operations of replantation, which is the returning of a tooth to the place in which it grew, and transplantation, which is the transferring of a tooth into a socket from which another tooth has been freshly drawn. This operation of implantation, which has aroused so much antagonism, and the success of which is viewed with so much skepticism both by the practitioners of our own profession and those of medicine, has been in my hands thus far as successful as any other operation requiring skill and judgment known to our art. The objections that have been urged against implantation are not only all those that have been made against transplantation,—the chief of which is the lia-



bility of the transmission of disease,—but the additional danger due to the traumatic lesion which is involved in the operation, and a supposed tendency in consequence to inflammation, pyemia or septicemia, tetanus, etc.

Another reason for doubting the success of implantation is the popular belief that the natural socket of the alveolus has a periosteal lining, and that it was to this periosteum that attachment to the peridental membrane, and consequently the tooth, was due. This or something like this has been the teaching of our schools and text-books. I think, however, that in the pamphlet issued by me last March I clearly demonstrated, by reasonable deductions, that no such membrane as a periosteum lining the socket exists or has any part in the formation of the cavity, and that the pericementum has no creative energy except upon its dental aspect, its alveolar surface having simply the power of forming attachment and drawing nourishment. That it has this power is evidenced by the fact that it will attach itself to the vascular structure of a cock's comb, so well proved in that particular experiment narrated by John Hunter, where the fowl was killed after a few months, and microscopical examination showed that the blood-vessels of the cock's comb had united with those of the peridental membrane, and so had established direct and continuous vascular communication between the two heterogeneous tissues. This same experiment also proved that the pericementum has no bone-producing power on its external surface; otherwise a bony shield would also have been found surrounding the root.

In the pamphlet referred to I called attention to the well-known fact that the crown was the first portion of the tooth formed by the dental pulp; that as it was developed it pressed upon the inclosing alveolus; that this pressure caused the absorption of the osseous environment, which absorption continued until the crown burst through its bony prison, and rose, as the body and root developed, to the apical termination, and attained its proper elevation in the mouth. As the cavity of the socket was formed by pressure, it is clear to see that no periosteum was employed in its formation. The crown being larger than the body of the tooth when it passed out of the jaw, left a space between the root and the walls of the socket, which, in the course of time, filled up with a bony substance identical in composition with the surrounding structure. Here we have an example and a clear proof of the ability of the alveolus to repair an injury done to itself. When the crown is forcing its way through there is no attachment to it, because it is like so much flint or porcelain; but as the root with its pericemental investment is developed, immediate attachment takes place, and the pericementum is

nourished and stimulated in its growth by the vessels of the alveolus. How does the space between the wall of the socket and the body of the tooth fill up? We have shown by the experiment in the cock's comb that the pericementum does not produce bone on its external surface, and as there is no periosteal membrane lining the socket, the space must be filled from the walls of the socket. Osseous deposition takes place, then, as in other bones when the lesion is remote from the periosteum, by proliferation of bone-germs from the endosteum; which, as you all know, is the delicate continuation of the periosteum in the interstices and cells of the bony structure, and having all the functions and powers of the mother membrane.

Now, I hold that the same conditions attend the operation of implantation as occur in the development and eruption of a tooth, with this difference, that in one case the destruction of the jawbone is subjective from within out, and in the other objective from without in. The one is physiological, the other traumatic, but it is in either case a lesion of structure produced by force, with the conditions in favor of the traumatic. For in the natural operation, as you are all aware, there is more or less constitutional disturbance, even sometimes to a fatal degree; whereas, in the mechanical process the disturbance is only local, and slight at that. When the implanted tooth is in position the relations are almost identical with those surrounding the freshly erupted tooth from its bony environment. It is tooth-substance,—pericementum, plasma, and raw bony surface. In this view of the matter, it is easy to understand that the tooth implanted is not more foreign to the alveolar process than is the tooth developed within its own substance. It is, therefore, no wonder that the intruder is accepted on the same terms as the developed tooth, especially in view of the fact that the alveolar process has no special intelligence, and is intended for no other purpose than the support and maintenance of teeth. Further proof that the jawbone accepts the new tooth on the same terms with its own, is that in the three instances where I have had to correct the position of these implanted teeth, after they had become firm, they have behaved exactly as do the teeth of native growth.

Now, as to the danger attending the operation. There is, of course, no operation, however trifling, that some hidden idiosyncrasy in the patient may not lead to dangerous results. The lancing of a gum has induced tetanus. The extraction of a tooth, even the too close snipping of a hair in the nose, has induced fatal hemorrhage, and so, in that view of the case, there is danger to some in performing the operation of implantation. But who would hesitate to lance a gum, or extract a tooth, or to snip a troublesome hair in his nose because

fatal consequences have attended these operations? So will it be with implantation! The great danger to be guarded against is the inoculation of disease. But it is no more so in implantation than in transplantation. Of the hundreds of cases of transplantation that have been performed in the United States, I have yet to hear of one where specific disease was communicated by it. One case—but that was replantation—is on record where it is said tetanus ensued. But was it tetanus or peritonitis? The danger of such transmission of disease has been very greatly exaggerated. Nevertheless we cannot be too cautious in our selection of teeth. Those only should be used where the tooth-substance has a clean, clear appearance. They should then be subjected to a bath of bichloride of mercury, 1 part to 1,000 of water, as an additional security. So powerful a germicide is this corrosive sublimate, even at this decimation, that it will destroy the life of, or at least render inert, the most baneful of germs; and this without affecting the vitality of the pericementum. The wonderful tenacity of life in this membrane is something that was not dreamed of until the accidental discovery related in my report to the California Dental Association, and a copy of which many of you have seen. Another danger would be the drilling into the dental canals; but this can be easily avoided by not drilling beyond the length of the other teeth. The canal, you must remember, is always beyond the apices of the teeth, and only a bungler would broach it.

There are two things that are always essential to success in implantation, and that must be considered before the operation is undertaken. They are, first, that the root has a fair covering of pericementum; secondly, that sufficient of the alveolar process be left to root the tooth properly, in order that it may be able to withstand the lateral and grinding movements of the jaw. At least two-thirds of the root should be covered by the gum and alveolar process. Where there has been but slight shrinkage of the alveolus it is not necessary to imbed as much root as the other teeth have. You have no doubt observed that, in teeth that have been elongated by disease, the disease cured and the projecting portion of the tooth cut off, the tooth has become as firm and performed its function in mastication as thoroughly as it did before disease had attacked and shortened its length in the socket?

In the operations that I have had the honor of performing before you, especially in the implantation of the two inferior centrals, a great portion of the external wall of the alveolus had to be removed. You will find that within one month sufficient osseous deposition will have taken place in front and on the sides of those teeth to hold them firmly in position. I have written this little paper in a great hurry,



and therefore have been unable to give this subject the consideration it deserves, and which you had the right to expect. Therefore, in whatever I have been deficient or obscure I will, if it shall so please you, answer any relevant question that may be asked, if it is in my poor capacity to do so.

*Discussion.*

The President. Before listening to the remarks to be made upon this paper, I will ask Dr. Jarvie to make a report as a member of the committee which examined the teeth of the lady.

Dr. William Jarvie. I can say very little in addition to what Dr. Atkinson has already said. The left central and right lateral incisors had been replanted. From what I saw of them I should say that the right lateral was as firm in the jaw as it had ever been; certainly as firm as any other tooth in the mouth. I could notice no recession of the gum whatever. Around the left central there was a slight recession of the gum, but no more than we usually see in teeth of so dense a structure and in the mouth of a person of the age of this lady. The bicuspid which had been implanted was apparently as firm as the other teeth, and the gum as healthy around it.

Dr. Kingsley. I would like to ask Dr. Younger a question in regard to these teeth that we have now under discussion,—whether after he extracted the incisors in this lady's mouth he removed the pulps, and if so, how; whether he refilled the canals with anything, and if so, what; and any treatment which he gave to that particular case?

Dr. Younger. There was a good deal of tartar on all the teeth, and of course I removed this and treated the gums before implanting the teeth, for I wanted to get the parts in as healthy a condition as possible before the operation. After the other teeth were freed from the tartar, and the gums quite healthy, I extracted the two elongated teeth, removed the tartar from them, and found that about one-third of the root of the central was covered with pericementum. The lateral had a better chance for success than the central, as about one-half its root had the pericemental covering. Then I enlarged the pulp-canal from the apex, removed all of the pulp, and washed out the interior of the canal thoroughly with a preparation of the bichloride of mercury. I then thoroughly dried it out and filled with Hill's stopping, until I came within about one-sixteenth of an inch of the end, where I used the preparation of Dr. Slayton, of Florence, composed of gold and tin, equal parts. I prefer that to gold in that locality. All I had to do then was to deepen the sockets and to replant the teeth. The replanted teeth

were kept in one day by means of ligatures, at the expiration of which time I took an impression of the teeth and made a strip of gold plate, struck up so as to fit the palatine aspect of the front teeth, extending from one cuspid to the other. Then I drilled two little holes in the gold on the line of each interstice and passed through them threads of fine waxed silk, and tied all the teeth,—the fixed teeth first. With the exception of treating the gums with a little iodine, I have done nothing at all since. Some days ago the lady removed the plate, and the teeth have been for several days without any support whatever. I wanted to give them a chance to get loose, if they would, whilst I could still give them some care. The plate was put in on the 19th of August, and was worn about six weeks before being removed. The lady had a habit of gritting her teeth at night, and she was afraid she would loosen the teeth if the plate were removed. The implanted bicuspid was so firm at the very first from mechanical adaptation as to need no support.

Dr. Dwinelle. May I ask Dr. Younger if he ever extracted any teeth that he had implanted to see whether any absorption had taken place?

Dr. Younger. Yes; there were two,—one a molar, quite apart from any other tooth, which it was impossible to support properly. The patient used the tooth in eating, and as it was only one-third rooted in the jaw, there was so much absorption that I found it would not be a success and removed it, with the intention of performing the operation again as soon as I could get a tooth with two long roots. The other one was a left inferior molar, where the outer plate of the alveolus had been entirely destroyed by Riggs's disease, and the roots were not at all adapted to the purpose. In that tooth, as in the former, attachment took place, for when I extracted it there were several patches of bleeding perisoteum on the roots, showing that there had been living union.

Dr. Benj. Lord. I would like to ask Dr. Younger his reasons for opening into the pulp-chamber through the foramen rather than through the crown. Would it not be better to preserve the end of the root intact, in its natural shape and condition?

Dr. Younger. You cannot always fill directly to the end of the root from the crown, because the canal is so small; therefore, I usually enlarge the canal from the apex. I would enlarge it whether I filled from the apex or the crown. Another reason is that it leaves the crown intact.

Dr. Woodward. When did you first perform the operation of implantation?

Dr. Younger. On the 15th of June, 1885. The tooth implanted was a lateral, and after it became firm—not being satisfied with its

position—I turned it in its new socket by the use of a simple regulating appliance. As a consequence a small abscess formed over it, but no one would now suspect that that tooth had not grown in that patient's mouth. The tooth was light in color when implanted, but now it is the same color as the other teeth. There is something singular about the modification of color of implanted teeth that I do not understand.

Dr. Perry. About how many teeth have you set in this way altogether?

Dr. Younger. About forty. I have had two failures, though they should not be considered as such, for I had but little hope for their success; yet I want to state something in the way of failures, in order that my successes may be believed in.

Dr. Geo. S. Allan. You stated that the replanted lateral incisor which we have seen to-night was coated with tartar half way up the root?

Dr. Younger. Yes.

Dr. Allan. Dr. Atkinson has said the gum had formed a close attachment to the neck of the tooth. I have always understood that tartar destroyed the pericementum. What was the nature, then, of the attachment which the doctor found there?

Dr. Younger. It was the implanted bicuspid from which Dr. Atkinson tried to lift the gum. In the replanted teeth there is nothing but a contraction of the gum around the necks. There is no real living attachment except where there is pericementum.

Dr. Lord. Will Dr. Younger tell us whether he thinks it desirable to cut off the end of the root and shape it?

Dr. Younger. Sometimes, where the root is crooked, and the tooth is too long. If I were to insert a tooth of too great length, I might possibly broach the dental canal. But I would prefer not to cut a root if it can be avoided, because the best portion of the pericementum is often around the apex of the root. The only time when I would broach the crown of a tooth for the purpose of removing the pulp and filling the canal is in those cases where the pericementum is healthy around the apex of the root, and but slightly distributed elsewhere. One case which interested me very much was that of an old lady who, in falling, had struck the right superior central and shattered the labial plate of the alveolar process. In the course of time the process and gum sloughed off, leaving the front and sides of the root of the tooth perfectly bare. It became elongated and hung down in the mouth, annoying her very much in speaking. She had a very strong prejudice against wearing an artificial denture, and I therefore tried to solve the problem for her in another way. The tooth was so loose that I removed it with my



fingers. As the crowns of her teeth were very peculiar in shape and not easy to match, I cut the root off the extracted tooth and fitted its crown to another root, which was well covered with pericementum. I then made a deep incision in the gum, deepened the socket with a bur, and inserted the tooth. That tooth is now as firm as any tooth in her mouth, bone having been deposited around the root; and there is nothing in the appearance of the gum or the tooth to indicate that such an operation had been performed. The lady says that only saints perform miracles, and as this is a miracle I must be a saint; but I am afraid she does not know me.

Dr. J. Smith Dodge, Jr. I think we are not so wholly on new ground here as some of us may suppose. After seeing the operations on Saturday, at Dr. Woodward's office, it occurred to me to look up John Hunter's account of his experience in transplanting teeth, written about one hundred years ago. He knew nothing of new sockets, nor did he even think of deepening the socket where a tooth had been partially pushed out by a new deposit of bone, as does Dr. Younger. In that case he either cut off the root and replaced his tooth, or selected another tooth with a shorter root. He merely transplanted from one mouth to another. He speaks of that operation as a very usual and constant thing in his own experience, as though he had performed it many times. He advises that a fresh tooth should be taken if possible, but says that many dentists prefer dead teeth (by which he means dry teeth), and that he himself has seen dead teeth become perfectly firm after insertion, and do service for many years. He advises the use of a fresh tooth, a little smaller than the socket, but says that, if you cannot get a fresh tooth that just fits the socket, it does no harm to file the root down until it will fit, and that as far as he has been able to see those teeth take hold no less effectively than teeth which are not treated in that way. This treatment, of course, removes the pericementum. And this is testimony over one hundred years ago, from a man who had done that frequently. Dr. Younger has spoken of preserving that pericementum with great care. I want to ask him whether there have been any cases in which he has not been able to preserve it, and whether fresh dentine without any pericementum will take hold just the same as if it had it?

Dr. Younger. It is probable that John Hunter filed only a portion of the root, not its entirety, and that therefore he left sufficient pericementum to make an attachment. In one case that I treated the root was so much larger than the cavity that I shaved off two sides of the root, and then forced it into the socket; but I was careful to preserve the pericementum on the other two sides. That particular tooth is in the mouth now, as good as ever; but no at-

tachment has taken place on the sides of the root that were shaved off. It was transplanted about an hour and a half after it was extracted, February 14, 1881,—nearly six years ago. I saw the lady three weeks before I left California to come here.

The President. What retained that tooth in place?

Dr. Younger. Attachment of the pericementum on the two surfaces that were not filed. Attachment will be formed in spots here and there where the pericementum is preserved. If half of the pericementum remains upon the root I would use the tooth with a reasonable hope of success. In one instance I implanted a tooth which had no pericementum upon it. I did it for two reasons: to gratify the patient, and to show the operation of implanting to Dr. Roussell, I think, the corresponding secretary of the Brooklyn Society, who was present and anxious to see it done. The lady was very anxious to have a lower molar implanted. I told her there was no possibility of its taking hold, as there was no pericementum upon the root, but she insisted, and I implanted it. It was put in as carefully as any tooth I ever implanted; looked very well at first, and was quite firm after the operation, but in about a week it loosened and fell out. I have no confidence in the implanting of teeth that have no pericementum.

Dr. Tenison. Have you tried cocaine in these operations?

Dr. Younger. I have tried it in various forms, in the strength of four and ten per cent., but it is not worth the bother of using it. The surface was paralyzed, but beneath the surface the tissue was not at all affected.

Dr. Tenison. Have you tried injecting it?

Dr. Younger. No; I have no confidence in it.

Dr. Jarvie. This subject of implantation is a most interesting one to me, and I think all the gentlemen who were fortunate enough to witness the two operations performed on Saturday afternoon, while they may have imagined that the results might be successful, will be certain of it after seeing what we have this evening. I anticipated that the teeth we saw implanted on Saturday would become firm, but I did not think it possible that the result of any such operation could be as beautiful as those we have seen to-night. With as strong a light as could be reflected, there was no difference discernible in the color of the teeth. The teeth replanted and the tooth implanted were just as translucent as those that have never been disturbed. The question will arise in our minds, Although the teeth are firm now, how long will they remain so? Probably all of us have had some experience in the replanting of teeth. I certainly have, and under varying circumstances and with varying results. I thought some of the teeth replanted would remain permanently

firm in the jaw, but absorption finally set in, and in the course of from two to twelve years resulted in the loss of the teeth. The most recent case was that of a boy of twelve years of age for whom I replanted two central incisors almost two years ago, and those teeth are now firmer in their sockets than any other teeth in the mouth. I removed the pulps in the manner Dr. Younger has spoken of, and filled the canals from the foramen. The circumstances were all against success.

Dr. Perry. What was the reason for that operation?

Dr. Jarvie. The boy fell on the ice and knocked the teeth out, at the same time breaking the cutting edges and fracturing the sockets. Before replacing the teeth I took an impression of the upper jaw, restoring in plaster the teeth that had been knocked out, and had a retaining plate ready. After the teeth were put in place, three hours after the accident, all I had to do was to slip in the plate. I built out with red gutta-percha a little tongue to hold firmly the two replaced centrals. That plate was worn for at least six weeks, being taken out once every day and cleaned, and the teeth were held immovable for that length of time. They were not tied.

But perhaps the most interesting point to me in Dr. Younger's paper is the statement that dead tissue can be reorganized; that the pericementum that has been dried on the root of a tooth for months can again become the medium of circulation and nutrition. I hope we shall hear from Dr. Heitzmann on that subject, for I know that any such theory is against all our previous teachings.

Dr. Carl Heitzmann. Gentlemen, Dr. Younger has demonstrated beyond the least doubt that it is possible to implant dead teeth into newly-made sockets. I am sorry indeed that to this excellent discovery Dr. Younger added some statements which I must contradict. It is a well-established fact that tissues that are endowed with life can be connected with other, even widely different, tissues. French soldiers in the Crimean war implanted the tails of rats into their noses, and after the nose and the tail had grown together they cut off the tail and brought the animals to Paris as a kind of novel species of rodent.

How often do we hear of the re-attachment of severed pieces of the skin and smaller portions of the body, by means of sewing them together. Indeed, such things are of daily occurrence in plastic surgery. Everybody knows that the reproduction of lost noses is based upon that principle.

It is quite different, however, when we speak of the implanting of a dead body. Will anybody doubt that a tooth that has been out of its socket for months or days, or even for several hours, is



dead? I suppose not. And nevertheless such teeth can be implanted. Is that very novel? I think not. In previous years, before the improvement in arms, and when rifles were less destructive than now, we have all heard of gun-balls being lodged in the bodies of soldiers and being allowed to remain there for years without doing any special harm. They were imbedded, sometimes firmly and sometimes loosely, and did not produce any reaction whatever. More than that, Billroth, over twenty-five years ago, made experiments on animals by breaking a bone and not allowing a union of the two broken parts. Some weeks or months afterward he opened the fractured part, laid bare the bone, and inserted a peg of dead ivory, by means of which he fastened together both ends of the broken bone. What was the result? The ends of the bone healed and grew together, and when the ivory peg was looked for, some months or years later, it was found diminished in size and corroded. Will anybody conclude that this ivory peg had been vitalized? Do we not know that any portion of the body is capable of encysting a foreign substance so that its presence will be tolerated? The experiments made by Billroth on fractured bones of men gave the same result, so far as the absorption of the ivory peg is concerned. The fact is before us that Dr. Younger has implanted dead teeth. If he claims that a root which is destitute of pericementum in all probability will not be permanently fixed in the jaw, I believe it; but if he says that the remnants of dry pericementum will be vitalized, this is going much too far. In sponge-grafting, where we get new tissue to penetrate the sponge, is any vitalization of the sponge to be looked for? No. The living tissue from without grows into the sponge and gradually destroys it. So far as I can see, from a biological stand-point, the explanation that there is living union between the implanted tooth and the socket is wrong. The doctor implants a foreign body which is surrounded by living tissues; in the latter a certain amount of plastic inflammation may tend to fix the root of the tooth, and the dry, dead pericementum, made aseptic, will play the rôle of a sponge in sponge-grafting, without ever becoming alive again. The same will happen to the root of an implanted tooth that happens to a piece of ivory inserted in the bone. The new growth will penetrate the dead tissue, and the root will grow smaller. I doubt very much that in a majority of cases the implanted teeth will remain firm over three or four years.

Dr. Younger. Evidently the gentleman has not read my pamphlet, which contains a statement in regard to an implanted tooth that had been out of the mouth for thirteen months and eleven days. I do not blame the gentleman for holding the view that he does, because this is something that requires to be seen, or to be

sustained by the testimony, not of one man, but of a number of men in whom we have the utmost confidence. In this case that I speak of the tooth had been out of the mouth for over thirteen months when the lady came to have it implanted. The pericementum around the root was quite dry and like parchment. I told her it was impossible to make that tooth grow; that I trusted entirely to the vitality of the pericementum to obtain a living union, and that on this tooth the pericementum was as dry and lifeless as parchment; therefore it would not succeed. Just as I had persuaded her that success was impossible, a certain passage in John Bell's work, where he criticises Hunter, came into my mind. It did not bear directly upon this subject, but it suggested the thought that perhaps after all there was in that dry parchment-like pericementum some germ of life that might become, under proper conditions, awakened, and its energies renewed; and so I told the lady that I would try it as an experiment. So, in the presence of Dr. Warner, of San Francisco, I drilled a socket and implanted the tooth. The lady commenced eating upon it, and in the course of twelve days she became careless and in biting upon a crust of French bread the tooth was so wrenched that it became quite loose. Violent irritation followed, and the gum bled profusely, especially on the palatine surface. She came to me crying. The tooth was so loose that I could move it in every direction; still it did not drop. I was anxious to test whether the pericementum was really alive and had formed a living union, or whether it was simply the nice adaptation of the walls of the socket to the root that retained the tooth in place. So I did not tie it, but only touched it with iodine and told the lady to be careful not to eat upon that side. In the course of a week it commenced to tighten; in two weeks it was quite firm, and now it is as solid as a rock. That operation was done last March. I tried to pass between the root of the tooth and the tissue of the gum a delicate flat instrument, to see whether the tooth was held mechanically or by living union; but I could not get the instrument up, and the attempt caused pain. It seems to me that the fact that this tooth became firm the second time, and the fact that I could not get an instrument between the gum and the root, proves that vitality was awakened in that pericementum. Absurd as it may seem, it must be so.

Dr. Weld. I presume Dr. Younger would feel disappointed if he did not meet with some adverse criticism to stimulate him in this matter; therefore I think he will excuse me if I criticise the practice somewhat. I have had some experience in the replantation and transplantation of teeth; have been through the same enthusiasm that Dr. Younger is going through with now, and I think he will

finally go through the same disappointment which I did. I have replanted between seventy-five and eighty teeth, beginning six or seven years ago; and I do not believe that there is now more than one of these eighty teeth in the mouth. I am therefore obliged to condemn the practice, except in places where it is absolutely necessary, in young persons. My knowledge of implantation, from the time John Hunter made a human tooth grow in a cock's comb, and my views of the physiological doctrine of repair, which differ very materially from Dr. Younger's, lead me to say that, in my opinion, the practice of implantation is barbarous and worthless. I have read Dr. Younger's pamphlet on the "Implantation of Teeth and Pericemental Life." It is pretty hard to criticise it, for on the first page the gentleman states that it is not free from crudities. Now, a crudity is something raw, something undigested; and *that* the paper surely is. It contains many statements which are unfair and misleading, and many which are purely suppositions and unsupported by a single fact. The paper throughout is sadly deficient in all points relating to the physiological doctrine of repair, so far as I can judge. This practice which has been recommended to us will be discarded precisely as replantation and transplantation were discarded, and for the same reason. Three weeks from to-night I am to read a paper before the First District Dental Society on this subject, and shall do what I can to help Dr. Younger digest a subject which he admits in his paper is undigested, and I will give him the opportunity at that time to criticise me as I have criticised him to-night.

Dr. Younger. I am sorry to say that I shall be three thousand miles away at that time. When I go back to San Francisco it is my intention to investigate this subject with the microscope, and see what that has to say about it. I am not very dubious about the result.

Dr. Jarvie. I would like to ask Dr. Weld if the failure of his cases of replantation were not the result of diseased conditions about the roots,—alveolar abscess, for instance.

Dr. Weld. Just the contrary. I became enamored with replantation, and the idea of crowning roots in this connection occurred to me, and I had special porcelain crowns made for the purpose. Probably fifty per cent. of all the teeth which I replanted were healthy teeth and had healthy environments.

Dr. J. W. Clowes. The unique operations shown us this evening are beautiful to behold, and, as illustrated by the presence of an intelligent and refined lady, are calculated to produce a very favorable impression. They remind me of some which I saw several years ago when Dr. Weld was an enthusiast in replanting and



transplanting teeth. At that time I was invited by him to see the wondrous results of his labors in this peculiar field. Cases were shown of work done months before, and apparently with success. Others were more recent and full of promise, while others still were accomplished in my presence with undoubting faith in their stability. I spent a forenoon in witnessing these results, and formed my opinion of their probable value. A month later, at one of our society meetings, as I entered the room Dr. Weld came up to me, still full of enthusiasm, and said, "In less than five years this will be the universal practice in our profession." "What practice will be universal?" I inquired. "Why, extracting teeth before filling them, inserting crowns upon their roots, etc." I replied that I hoped not, for what I had seen at his office had affected me so unfavorably that the practice of those operations was something terrible to contemplate; that I went home after visiting him and scarcely slept at night from thinking of the mistake he had made,—the mischief he was working by his hands, and the influence he might have upon others in leading them astray. "Ah," he said, "you make me feel very badly." Through courtesy I had refrained from expressing any opinion before, but, approached in this way, I could not withhold it any longer. Five years later I met Dr. Weld, and inquired if he still practiced those operations. "Oh no," he replied; "I have long since given them up; they were all miserable failures." I said, "That is just what I expected they would be." Ever since then I have had a high opinion of Dr. Weld, and consider him a sensible young man,—because he not only had the wisdom to discover what was wrong, but sense and pluck enough to take the right side when convinced of his error.

Dr. Allan. We can look at Dr. Younger's paper from two stand-points. One is the stand-point of fact; and the facts that we have seen to-night show that teeth can be implanted and made for a certain length of time to keep their place. Further than that I would not go with Dr. Younger. From a physiological stand-point I think the practice will prove erroneous and misleading. I think Dr. Younger's description or theory of the way in which implanted teeth are retained in place is open to criticism. I am not aware that any distinct membrane has ever been discovered as lining the lacunæ of the bone; certainly such a membrane has never been demonstrated as lining the canaliculi of the bone; and there cannot be, therefore, even a minute portion of the pericemental tissue in the new socket that is made. But there can be a plasma thrown out, which will form an artificial cement, as it were, around the implanted tooth, and for a time hold it in place. But, just as certain as the laws of life and death prevail, there is incompatibility

between living tissue and dead tissue, and the time will come when the living tissue will throw out the dead, and the implantation will be a failure. There can be no living union between dead tissue and living tissue. The teeth which Dr. Younger extracts and implants into new sockets in the bone have, he says, a pericemental membrane. Underneath that is the cement, which has been out of the mouth for some length of time. Dr. Younger cannot maintain that that is living tissue. The cementum is dead and the dentine is dead. But granting, for the sake of argument, that the pericemental covering is not absolutely dead, the preparation which Dr. Younger applies—the bichloride of mercury—would certainly destroy any remaining life, as it acts directly upon the protoplasm. This union that we see is most beautiful, but it is not a living one. Such operations are doubtful at best, and always dangerous.

Dr. O. E. Hill. Dr. Allan has stated that there could not be union between living and dead tissue. He also stated that if there had been any life in the pericementum it could not possibly survive the course of treatment to which Dr. Younger subjected it. I was anxious to learn whether there was any attachment between the gum and the implanted tooth which we have had the privilege of seeing this evening, and I gave Dr. Atkinson my pen-knife and asked him to try to ascertain. He did so, and reported to me that the gum was thoroughly attached to the tooth. The knife-blade was very thin, and he used it very carefully, yet the lady winced and the blood started in trying to separate the tooth from the gum. Does not this prove either that the pericementum of that tooth possessed life when implanted or that living and dead tissue do unite? I have seen Dr. Younger operate several times, and have each time been surprised to see how carefully, tenderly, and rapidly the teeth were implanted. I wish to call attention to one point in Dr. Younger's practice which seems very singular to me. When he implants a tooth he expects it to become, within a week or so, a line or two shorter than it was when inserted; he makes allowance for that, and it does become shorter.

Dr. A. H. Brockway. I do not propose to spend time in discussing the question as to whether there is or can be a union between dead tissue and living tissue, but I wish to make this point: Here is an operation performed which is an apparent success. We have statements that similar operations have been made where success has obtained for as long as twelve years or more. The average of success undoubtedly has been several years, even under the unfavorable conditions in which the operation has been many times performed. Now gentlemen get up and say that this operation can only be a failure. Failure is a relative term. We are all in the

habit of speaking of our success in filling teeth. What is the average duration of our fine fillings? I fancy most of us would be ashamed to say, if we knew. It seems to me that an operation that promises to endure successfully for at least several years, if properly done, cannot justly be considered a failure. Suppose that the teeth are expelled after a term of years. What is to prevent the operation being repeated? Viewed in this way, it seems to me that we have practically success in this operation.

Dr. Perry. I think the operation we have seen so well illustrated this evening may be called successful if the teeth last only three or five years. At all events, it would be very hard to convince the patient that the operation is not a success. Whatever may be our learned theories, we must not shut our eyes to the accomplished fact which is before us in this lady's mouth. I have seen enough of Dr. Younger's work during the last ten years to satisfy me that, if any one can make a success of these operations, the delicacy and skill of his manipulations will enable him to do it. On general principles, I should be ready to sustain him in his practice of opening the apex, removing the pulp, and filling the root from that end. In replacing teeth I have never managed them in that way, but the idea, which I confess is new to me, is one that I should favor. Treated in this way, there could be no chance of leaving any portion of the pulp at the apex to give rise to future trouble.

Dr. Brockway. I think I express the sentiments of the society in saying that we are under great obligations to Dr. Younger for his kindness in coming before us with his paper, as well as for the clinics which he has given for our instruction. Therefore, I move that the society tender him a vote of thanks.

Dr. Brockway's motion was carried.

Adjourned.

S. E. DAVENPORT, D.D.S., M.D.S.,

*Editor N. Y. Odontological Society*

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## FIRST DISTRICT DENTAL SOCIETY, STATE OF NEW YORK.

THE First District Dental Society of the State of New York held a regular monthly meeting, Tuesday evening, October 5, 1886, in the rooms of The S. S. White Dental Manufacturing Company, Broadway and Thirty-second street.

The president, Dr. William Carr, in the chair.

Dr. C. F. W. Bödecker, chairman of the Clinic Committee, reported as follows:

Mr. President and Gentlemen: The clinic to-day was one of the most interesting that we have had since I have been on the Clinic



Committee, both in regard to the work performed and the number in attendance, which was about one hundred persons. \* \* \* Dr. J. F. Pitts presented a boy twelve years of age with erosion of the four upper incisors and the lower central incisors, near the gum. The teeth seemed to be otherwise well preserved and of good material, but the eroded surfaces were quite extensive. It was advised to fill them temporarily with oxyphosphate. \* \* \* Dr. Gilson, of Boston, exhibited a pair of tweezers to be used as foil-carriers or for other purposes. He also exhibited some rubber and cloth disks for polishing, made of ordinary rubber packing, which he claims will wear very much better than rubber alone. \* \* \* Dr. Shumway, of Plymouth, Mass., who is with us to-night, very kindly consented to operate this afternoon, and filled a very large cavity in a right upper central incisor, occupying the mesial and cutting surfaces of the tooth. The tooth was devitalized and the pulp-canal cleaned out and filled with cotton and oxyphosphate. The filling proper was then commenced with velvet cylinders, and completed with White's No. 4 1000-fine gold, which was introduced by ivory points. \* \* \* Dr. Starr, of The S. S. White Dental Manufacturing Company, exhibited a new vulcanizer which has a lever over the top of the lid of the vulcanizer, the lid being fastened by only one screw. This admits of the vulcanizer being opened and closed very quickly, even when it is very hot, without any danger. Dr. Starr also exhibited a new Lee blowpipe. \* \* \* Dr. Younger, of San Francisco, implanted a right upper central incisor. The patient was an employé of The S. S. White Dental Manufacturing Company, and this will give us a good opportunity to watch the case and see what the result will be. The tooth had been out of the mouth for about a year and a half, and the one that was inserted had been recently extracted at the Cooper Institute. I did not see the first part of the operation, but I believe that he removed the gum and then with a bur cut into the alveolus until the root fitted properly. The patient, who is here to-night, tells us that the tooth feels comfortable and that he has been able to eat without any pain whatever. \* \* \* Dr. Reese, of Brooklyn, showed his method of inserting gold and amalgam fillings by first lining the cavities with oxyphosphate, and then, while the oxyphosphate is still soft, putting in the first layer of gold or amalgam or whatever material he may use. In this way he gets an anchorage of the gold or amalgam in the oxyphosphate. He demonstrated his method out of the mouth in teeth set in plaster. \* \* \* Dr. F. A. Steurer and Dr. Dwinelle were experimenting with gold this afternoon, particularly with Dr. Steurer's gold and Watts's gold. The result cannot be made known yet, as there was not sufficient time to complete the experiments.

\* \* \* Dr. L. B. Wilson, of Cumberland, Md., sent to us a package of his new plastic gold, which, owing to the lateness of the hour, was not sufficiently tested to announce the result to-day, but at the next clinic the experiments with this as well as with the German plastic gold will be completed. I have heard several gentlemen who have tried Dr. Wilson's gold speak of it at the clinic, but none of them seemed to be very favorably impressed with it. One gentleman told me that he made a filling with it about a week ago, and the gold was this morning so soft that he would have been able to remove the whole filling by means of an excavator. Dr. Wilson also sent to the clinic several other new things; among them some screws which have been coated over with tin or some other metal, and which are designed to be used for mending broken rubber plates and teeth. A screw is put into the rubber plate and the tooth ground to fit as you may want it, and the rest of the space between the screw and the tooth is filled up with solder, samples of which were sent to the clinic. He sent also some metal screw-loops for mounting artificial crowns, and a sample of white amalgam which he claims will not discolor, to be used for front teeth. \* \* \*

Dr. H. C. Meriam, of Salem, Mass., exhibited some Mushess steel which is a very remarkable article. The doctor first made the steel red-hot and then let it cool gradually. Doing this to any other kind of steel would soften it, but this steel will not soften in the least; it was just as hard as glass, even harder than ordinary hardened steel. The doctor had some porcelain teeth there which had been drilled out by means of a diamond, and the holes were reamed out and made larger by means of a piece of this steel. The steel is made by a new process, and cannot be made soft, and will never become soft. The doctor also exhibited some of his new screw-posts, and showed us how to make them; also, a pair of forceps which spread upon pressure, and which I think are very useful for widening ferrules or collars of crowns, or even crowns themselves. The doctor also exhibited many other instruments, such as new forms of chisels and excavators, rubber polishing-points, wheels impregnated with emery or corundum, and China grass thread for regulating teeth, which is exceedingly strong and tough and will not stretch after it has been put around the teeth. \* \* \* Dr. George Evans exhibited some bridge-work in which I think there is a little new feature. There are three bridge-pieces here which the doctor allowed me to show to-night. These bridges are made of metal and rubber, using ordinary rubber teeth. The new feature of it is that he makes a recess near the neck of the tooth, mainly on the buccal portion, and then fits the clasps in such a manner that they rest upon the recess, and cannot go up any higher. He lets the

rubber go to the gum a little way, so as to get a little support from the gum as well as from the roots. This case can be removed by the patient very easily, cleaned and put back, and yet it is a very nice piece of bridge-work, without a plate. All these three pieces are made on about the same principle. \* \* \* Dr. J. M. Crowell, of New York, also exhibited a piece of bridge-work which was made out of twenty-carat gold and enameled with his new gum enamel. Dr. Crowell: It is not an enamel. It is a body and a gum. The body is first baked over with two bakings, and then enameled with the gum enamel, and that is baked. It is the same as continuous gum, only stronger. \* \* \* Dr. Bodecker: I then showed at the clinic a very remarkable model which I have here and which I am sorry to say has been broken in coming over to this country. This model represents a double lower jaw in one. The patient is in Germany. I expect to republish what has been published there regarding the case as soon as I can. I understand it will be published in the next number of the German journal. It is a very remarkable case, and I believe the only one on record of this character. I also exhibited a piece of aluminium bronze which has been sent by Prof. C. Sauer, of Berlin, who has made use of this metal in the mouth of his patients as a base for artificial dentures, regulating plates, springs for securing double sets, etc. It is very tough and can be heated to a white heat. We tried it this afternoon in the clinic, and I believe it may be soldered, although of that I am not informed. The composition of this aluminium bronze is, if I remember rightly, aluminium, zinc, and copper. It is very sonorous, exceedingly tough, and very light.

Horatio C. Meriam, D.M.D., of the Dental Department of Harvard University, read the following paper, entitled

#### GUTTA-PERCHA AND ITS USES IN OPERATIVE DENTISTRY.

Gutta-percha is the product of the *Inosandra gutta*, a tree found throughout the southern part of the East Indies and the large islands of the Asiatic Archipelago. This tree is often over seventy feet in height. The juice can be seen in lines under the bark. This material was first introduced by Dr. Montgomery, in 1842. During his walks he noticed a Malay laborer in the fields working with a hoe the handle of which attracted his attention. He learned that it was made from the juice of a tree; that it could be molded when hot to any desirable form, and was used for making canes, handles for whips, etc. He introduced it into England, where it was at once made use of. A lot had been sent there some years previous, but had not been understood.



Rubber, a similar material, was discovered in 1735. The celebrated chemist, Dr. Priestly, called attention to its use for erasing lead-pencil marks in 1770. It is derived from a much larger range of plants,—among others, some species of the fig-tree. It is claimed by some that rubber is contained in all plants that have a milky juice. Milkweed contains about four per cent. of rubber. A rubber has been made from linseed oil.

Birch bark boiled for a long time gives a material that responds to all the tests for gutta-percha, and it is curious to note that pure gutta-percha that has been sheeted resembles strongly birch-bark. The juice of both rubber and gutta-percha is a milky fluid, but that of gutta-percha, unlike rubber, coagulates when exposed to the air, like blood, and it may be skimmed off and kneaded together. The trees were first cut down to collect the juice, and upwards of 300,000 were sacrificed before the waste was stopped. Now the trees are planted and tapped, and the gutta-percha formed into large, longish lumps like small hams. It is at times formed by the natives into odd forms of beasts, birds, and reptiles. As found it is often adulterated, but owing to advanced knowledge pure gutta-percha can be more readily obtained than formerly. We have to distinguish between two forms of adulteration: those used for the purpose of fraud in weight,—that is, foreign substances such as small stones, sand, and pieces of bark; and, second, those that combine with it to injure its strength,—pitch, tar, etc. But, strange to say, none of these latter interfere with its hardness when cold. This last adulteration the dentist has to guard against, and therefore to test its strength it should be slightly warmed. The two best grades are known to the trade as "G. P. A." and "G. P. F." The G. P. A. is of a light-brown color, and the G. P. F. when sheeted is a beautiful marbled white.

There was an article introduced by the Chinese the use of which was unknown for a long time, but it was finally discovered that it was used entirely for the adulteration of gutta-percha, and that is now guarded against. Crude balatta much resembles gutta-percha, but when sheeted the difference and its inferiority appear. Gutta-percha is pliable at 77 and 86 degrees F., soft at 112, melts at 248, and is decomposed beyond this point. It enters extensively into the arts. It has made submarine telegraphy possible. A piece of cable covered with gutta-percha which had been submerged for more than fourteen years was found to be in perfect preservation. It is also used for hose for conducting hydrochloric acid for the lining of tanks in which it is transported and for lining tanks in which glass is etched. It constitutes the principal cement used in the shoe-shops when dissolved in bisulphide of carbon. There is also an elastic

cement for cementing the soles of shoes, of which it forms a part. It enters into the manufacture of artificial leather for the linings of shoes. It is soluble in all things that dissolve rubber, essential oils softening and dissolving it under heat, and completely soluble in chloroform. Cables buried near the roots of oak-trees are often attacked by a fungus, and in parts of Kent, Wales, and near Dublin, by a small insect. It possesses a very strong fiber, and one which, unlike rubber, is elastic only in one direction. This is taken advantage of in the making of the materials which I have here, and in no case is it made so as to destroy this fiber. As evidence of its strength, a hose one-eighth of an inch thick and one-quarter of an inch bore was tested at 387 pounds, at Birmingham, England, the utmost pressure of the pump, without affecting it in the least; and it has been subjected to a pressure of a height of 450 feet without injury. The same pressure in a leather hose sent the rivets flying in all directions.

The gutta-percha is prepared from these large lumps or hams previously spoken of, cut into pieces, heated in hot water, kneaded together, and torn apart by a machine called a tear-wolf; rolled between rollers revolving at unequal speed, so that the material is not only rolled but stretched. You will notice, in the laboratory gutta-percha, that it retains this stretching until set free by heat, and that immediately upon being warmed the piece will contract.

Gutta-percha has a tendency after a time to go back to a resin unless protected from air and light, and experiments have determined that it is best preserved in water. In a series of experiments undertaken by Miller, "a sheet of gutta-percha was exposed for eight months under the following conditions: First, in a netting open to the air and light, but excluded from the rain; second, in a bottle open to the air and light, but excluded from the rain; third, in a bottle open to the air, but excluded from the light; fourth, in fresh water open to the air and light; fifth, in fresh water open to the air, but excluded from the light; sixth, in fresh water excluded from air and light; seventh, in sea-water exposed to air and light; eighth, in sea-water excluded from light, but exposed to air; ninth, in sea-water excluded from light and air. Specimens Nos. 4, 5, 6, 7, 8, and 9 were hardly altered, and with the exception of a slight increase in weight, due to the absorption of water which they lost after exposure to air for two hours, they did not appear to have undergone any change. No. 2, which had been kept in the bottle, the mouth of which was open, had absorbed 5 per cent. of oxygen, 55 per cent. being converted into resin; the inner portions, screened from the light by the outer folds, were but slightly altered in texture. No. 3 had undergone but little change, having increased in weight

but 5 per cent., and yielded to alcohol only 7.4 per cent. of resinous matter. Another sample, which had been exposed to the light two months, had become quite appreciably increased in weight,—5 per cent,—and yielded 21.5 per cent. of resinous matter to alcohol; while a piece of the same sheet kept in the dark had undergone no sensible change. Pieces of cable which had been submerged for periods varying from a few weeks to seven years were examined, and in no case where the cable had been completely and continuously submerged was any sensible deterioration in the quality of the gutta-percha found." There has been exposed to air in my office the sheet I show here, now brittle; was soft and pliable a year ago.

As gutta-percha varies so much with age and in different qualities, the difficulty of giving any fixed proportions for dental purposes is obvious. Different qualities will, of course, require different proportions to bring them to the firmness required. For this reason I prefer to start with pure gutta-percha, working in about six parts of foreign matter; then testing and working from there onward. We must remember that no strength is added by our material. We may add hard materials, but that does not indicate toughness. In a diamond ring, though you may mark on a window-pane with the diamond, yet it will not bear greater strain than its setting. For this reason sharp substances—silex, pumice, and the like—I consider unfitted for use with gutta-percha.

A great many varieties of substances have been recommended for this purpose,—chalk, quick-lime, oxide of tin, oxide of zinc, and the various forms of mineral earths, talc, etc. And thus:

Imperial Cæsar, dead and turned to clay,  
Might stop a hole to keep the wind away;  
Oh, that that earth which kept the world in awe  
Should patch a wall to expel the winter's flaw!

For a dark-colored stopping I should use G. P. A., the best grade known to commerce, and for the light G. P. F. They may be mixed for a medium. For convenience they had best be bought sheeted, keeping in mind that the different forms in which it is offered do not indicate different varieties. The gutta-percha should always be fresh, and feel soft and unctuous in handling.

Here, again, I would speak of the toughness of the fiber and the advantages derived from the use of pure gutta-percha. The splint gutta-percha, often called pure, which is occasionally recommended, is adulterated with tar or rosin, and you can readily see that such adulteration must injure its fiber, and that the addition of any of the foregoing substances could not overcome that original defect.

Many of the early gutta-perchas introduced for the use of den-



tists were made by dissolving in chloroform and stirring in the hardening materials.

The first step in the process of making is to send a one-layer raisin-box to a foundry and have a casting made. This iron is heated and covered with the oxide of zinc; then the gutta-percha is cut into pieces of the size of the iron, and laid sheet upon sheet with the oxide of zinc between each. The pile is then lifted to the iron and rolled out with the common rolling pin; also kept well covered with the oxide. Pure gutta-percha can be obtained by dissolving in chloroform, drawing off with a syphon, and then distilling off the chloroform, or dissolving in bisulphide of carbon and filtering through animal charcoal. These methods need not be used to-day, as G. P. F. sheeted will be found white enough for all purposes. It is a good plan to keep the iron covered with an old towel well loaded with oxide of zinc, and to roll the gutta-percha between its folds.

I cannot tell you anything of the desirability of gutta-percha. Each of us has had experience of failures and successes, but the opinions of those who use gutta-percha as a temporary or permanent filling may be stated to be that, for the sake of the condition of the tooth filled with it, they submit to the annoyance of more or less renewals needed. I have all the admiration for fine work that any one can have, and do not recommend this to take the place of it where the work can in any way be made permanent.

But to fill, as I have known, the tooth of a rapidly-growing blonde child with cohesive gold, consuming five or more hours in the operation, does not seem to me the work of a dental physician.

I have never directed the cutting off of portions of the gutta-percha fillings, but the pressing of them firmly into the cavity, using the sharp edge of the cavity to cut off the surplus; and I have not met with the shrinkage that other operators speak of.

Of its use in dentistry little need be said by me in detail. I will only speak of methods that I have introduced. Fitting crowns by impression I have already given to the profession in the August number of the DENTAL COSMOS. Its use in fitting by impression is of importance in treating cavities difficult of access. A small piece of gutta-percha is softened by heat, and pressed into the cavity after excavation without drying. This gives the impression of the cavity; remove, and trim even with the outline of the cavity. This is then dipped in the oil of cajeput, heated, the cavity dried, and the gutta-percha carried to place and pressed home. The same method can be employed in cavities on the lingual side of the lower third molar, or in cases so far below the gum that complete dryness is impossible. The pressing in of the gutta-percha,

coated with this soft mass, carries with it the moisture of the cavity, and we get adhesion under water. [Illustrating in a tumbler of water.]

Do not misunderstand me here; I have no desire to recommend this except in extreme cases. In practice it is of great value when called to patients confined to their rooms or beds of sickness.

The same method may be used in root-filling. A gutta-percha point or piece softened, of about the right size, should be fastened to the end of the instrument, dipped into oil, and worked in and out until the impression of the root-canal is secured, and then slipped off into place. It may be pressed up with a pledget of cotton moistened with alcohol. The gutta-percha for this purpose should be of sufficiently good quality to hold a point well when drawn out,—rather fibrous than friable.

As a matrix in large cavities for retaining medicine, especially when applying arsenical paste, a piece may be fitted between the teeth and pressed out from the inside with oiled cotton, formed with burnishers, and made water tight, and thus give for this purpose all the advantage of a crown cavity.

The same may be used when filling with amalgam, for we can easily arrange for the rounded approximal contact or knuckle so much desired with a heated burnisher pressed into the gutta-percha matrix where we wish the point of contact to come. One advantage of this matrix is that it can be worn without irritation of the gums, and need not be removed until the amalgam is hardened. It is my practice to cover all dressing with a piece softened in oil, not only for cleanliness between the visits of patients to the office, but I am much better able to judge of the progress of disinfection, as it can be seen that all the odor, if any, is from the canals, and not from cotton foul from being worn.

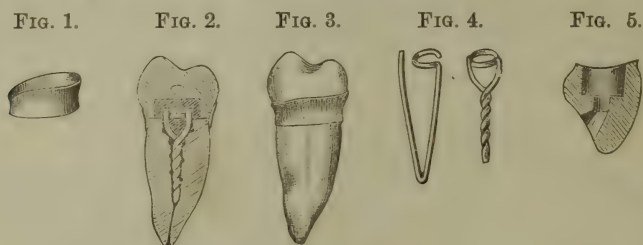
As I am not able to procure the crown I desire in the depots, I have used the countersunk tooth by banding the root, grinding in the tooth, spreading the band both where it fits the root and the crown so that it tightens in both directions. (Figs. 1, 2, and 3.)

I now use phosphate of zinc for fastening the band to the crown, but have great hopes in the new tooth-body introduced by Dr. Crowell. I expect in time that we shall be able to fit the band to a crown, put in a little body, and then bake it on. The dowels are here shown, or one may be made from wire by bending so as to fit inside the tooth and twisting together to pass into the root-canal. (Fig. 4.) This is shown in Fig. 2.

In some cases I drill out the pins of the countersunk tooth, which gives me a tooth that may be used in many ways. (Fig. 5.)

It may be well to state why I introduce the use of oils for soften-

ing instead of using chloroform. Chloroform completely dissolves it. I only wish to soften the surface. Oil also softens the oxide, making more of a paint or cement. The joints of gas-pipes are made tight with an oxide mixed with oil. The paint in most of our rooms is oxide of zinc and oil. One of the most valuable buildings in my own city has for the outer covering of its roof canvas painted with white-lead paint. This was nailed on and then painted again, and is thus secure by an oxide and an oil. The



heavy linseed oil is of especial value here, so that one of our future root-cements may be an oxide with some purified oil of like quality. Again, many of the oxides of zinc are soluble in both acids and alkalies. It may have been noticed that the oxide of some gutta-percha fillings near the margin of the gum seems to wash out. In such cases I should use an additional quantity of oil and smooth with a burnisher dipped in oil.

President Carr. The second paper which will claim your attention this evening is by Edward C. Kirk, D.D.S., of Philadelphia, and is entitled

#### A CONTRIBUTION TO THE ETIOLOGY OF EROSION.

Mr. President and Gentlemen: When the chairman of your executive committee honored me with an invitation to read a paper before your society, the choice of a subject which would prove acceptable became a matter of some difficulty.

The topic which I have selected is one upon which I have devoted some especial investigation and thought during the past two years, and inasmuch as the conclusions at which I have arrived are at variance with the views held by many of our profession, and as there seems to be a lack of unanimity of opinion as to the cause of erosion of the teeth, I am encouraged to lay before you my conclusions, which are based upon observations I have from time to time made, asking for them your kindly consideration, and, in so far as they fall short, your indulgent criticism, as it is my intention that the views advanced shall be regarded as tentative only until further investigation shall have established their correctness or otherwise.



Loss of tooth-structure, occurring as the result of some process other than that which we understand to be dental caries, is a condition that has long been recognized, and several theories have been advanced to account for its origin and cause. The terms "abrasion," "erosion," "denudation," etc., which have been used in connection with the condition, are indicative of the principal theories held as to the etiology of the disorder; abrasion pointing to a mechanical and erosion to a chemical or pathological origin. Denudation, which simply expresses the result, may be applied to either or both, though it fails to indicate what the possible cause may be. Though the appearances presented by a denture subject to erosion (which term is preferred for reasons which will appear further on) are familiar to you all, it will not be amiss to call your attention to some of the prominent and characteristic features of the disorder in its various stages.

Erosion may attack any of the teeth in either denture, but is commonly manifested in the anterior teeth, and most frequently in those of the upper jaw. The disease may commence as a single minute pit or depression upon any portion of the labial enamel surface of a tooth, gradually extending its borders until the whole outer enamel plate is removed, or it may progress in only one general direction, which may be in the line of the vertical or horizontal axis of the tooth, in the form of a tortuous groove, presenting in the latter instance the appearance of a piece of flooring which has been worm-eaten. Again, several pits or depressions may make their appearance at the same time, and by gradual extension of their margins finally coalesce to form irregularly shaped areas, which are completely denuded of enamel. Still another manifestation of this peculiar disorder is seen in cases where the whole labial enamel surface of the six anterior teeth is completely and evenly removed, while their approximal surfaces are unaffected. Such dentures present an appearance exactly similar to that which would be produced by evenly grinding off the whole of the labial enamel of the six anterior teeth, giving them a flattened appearance on their labial aspect, in addition to the peculiar laminated effect produced by the alternate layers of denuded dentine and the enamel of the approximal surfaces, which has remained intact, the teeth being actually viewed in cross section.

Two such cases have come to my notice in which the denuded surface was perfectly regular and even, and, like all cases of true erosion, which has its expression in dense, hard tooth-structure, it was highly polished. Still another condition of eroded teeth is frequently observed, in which the denuded area has a wavy or undulating surface, the long axes of the elevations and depressions cor-

responding with the horizontal axis of the tooth. In such instances the loss of tissue is generally greatest at or toward the cutting edges, which finally become involved, until occlusion of the anterior teeth becomes impossible, owing to the shortening occasioned by loss of structure. This is probably but a more advanced stage of the condition just described. Two other manifestations of erosion are met with. The first one, which is most common, and which is undoubtedly responsible for much of the difference of opinion and confusion which exists as to the cause of the malady, is that which occurs at the necks of the teeth, just at the free margin of the gum, and the simplest expression of which is a narrow, transverse groove, highly polished and varying in depth from a shallow depression to a cavity which may nearly invade the pulp-chamber. It is noticeable in this expression of erosion that the enamel margins of the eroded spots frequently project or overhang, presenting sharp edges or points which may become sources of irritation to the tongue or lips.

Also, when the disease has sufficiently advanced, the contour of the margin of the eroded area presents a ragged or irregular appearance, which in the earlier stages of the disease presented an almost straight or an unbroken curved line, points or prolongations of the eroded area extending in the line of the vertical axis of the tooth towards its cutting edge. Lastly, erosion may cause loss of enamel from the approximal surfaces, while the labial and lingual surfaces are comparatively unaffected. This condition I have never observed except in the lower front teeth, and then only when they were somewhat separated from each other.

Any tooth in the upper or lower denture may be the seat of erosion, and pulpless teeth as well as those which are otherwise normal. Whatever may be its origin, the disorder is progressive, the action extending not only in the plane of the labial surfaces, but into the deep structures of the tooth, until the pulp-chamber becomes invaded by the deepening of the eroded spots. Actual exposure of the pulp from erosion is, however, a comparatively rare occurrence, as the progress of the disease apparently induces a deposition of secondary dentine in the pulp-chamber, and consequent recession of that organ. Fracture of the teeth at their necks, however, is not infrequent, when by reason of extension of the disease the tooth becomes so thin that only slight mechanical violence is necessary to induce a sudden separation of the crown from the root of the tooth. The progressive character of erosion is fully and graphically shown in those cases where in its early stages the pits or depressions which are the seat of the disease have been carefully filled and the contour restored with gold. These, after a length of time varying

with the activity of the morbid process, will be found to exhibit a most peculiar appearance, the tissue surrounding the gold filling having apparently melted away from it by some process which, apart from the fact that a cavity is its result, has no points of similarity whatever with the ordinary manifestations of caries. The margins of the eroded areas have extended far beyond the gold filling which marked their original limits. The cavity has deepened and the filling stands out like an island in a small lake, with not even a trace of any of the usual products of disintegration of tooth-structure always observable as the result of carious action. Moreover, the entire surface which is the seat of erosion is clean and highly polished.

It seems to be generally conceded that, whatever erosion may be, the action is not an expression of that process to which the term "dental caries," as now understood, is applied. It presents no points of similarity sufficiently strong to admit of its classification with that disease. The manifestation of erosion in which the seat of the disease is at the necks of the anterior teeth, and is accompanied by recession of the gum, and the form of the eroded area is that of a groove or gutter-shaped depression in the line of the transverse diameter of the tooth, has suggested the idea that the origin of the trouble is purely mechanical, and that the inordinate use of the tooth-brush, armed with dentifrices, in the course of time produces the grooved appearance described. The conclusion has then been jumped at that all cases of erosion are explainable on the same hypothesis.

That belief in this explanation of the origin of erosion is widespread, cannot be doubted, as it is held and maintained by men of large experience in dental practice and teaching. In support of this I will quote the following statement by Dr. W. G. A. Bonwill, in a paper read before the Odontological Society of Pennsylvania at its meeting of November 7, 1885, and published in *The Dental Office and Laboratory* for July, 1886. He says, "I have never seen a case where the teeth had been generally eroded but could be accounted for by friction, and nothing else." The statement is emphasized by italics.

That the view as expressed by Dr. Bonwill voices the belief of many dental practitioners as to the origin of erosion will probably not be questioned. That it is untenable seems evident from the following reasons:

1. Erosion is not confined to those who use the brush to an undue extent,—that is, those who habitually employ the brush and powder several times a day in cleansing the teeth.

2. Of those who do so use the brush, but a small fraction manipulate



it in the direction of the vertical axes of the teeth, but always brush them in the direction of their horizontal axes; therefore, as erosion may and does follow a course in the line of the vertical axes, it becomes a mechanical impossibility for a brush and powder used horizontally to cut a groove vertically. In support of this I have in my practice a lady patient who is afflicted with erosion of the vertical type on the incisors and cuspids, who has always brushed her teeth across the horizontal axes, and never in the vertical line until so instructed recently.

3. Erosion occurs upon the approximal surfaces of the lower incisors and across their cutting edges, leaving the labial and lingual enamel surfaces intact. That such a condition can be produced by abrasion with brush and powder would seem to be another mechanical impossibility.

4. The surface subject to erosion is often beautifully and more highly polished than the surrounding normal tooth-structure, a condition of surface which the brush and any abrasive powder used as a dentifrice could not possibly produce.

5. If the condition under consideration were due to abrasion by brush and powder, in teeth whose alignment is irregular, and which are the subject of erosion, one would naturally expect those which occupy the most prominent positions to be affected to the greatest extent. A careful observation, however, establishes the fact that individual teeth may be extensively eroded, even when they occupy a position posterior to the adjoining approximal teeth, and are to a great extent protected by them from the action of the brush.

6. Erosion of an extensive character may occur suddenly,—that is, the enamel may be removed entirely from the upper third of a number of teeth, and the dentine exposed, in the course of six months, and the disease be confined to one side of the mouth only, in individuals who have always pursued one method of cleansing the teeth with powder and brush, and whose habit in this particular has not changed in any of its details.

A condition of hyperesthesia generally accompanies the disorder, and is usually more pronounced in its early stages, or just at the time the dentine has become exposed from loss of its enamel covering. At such times the touch of the brush produces a sensation of discomfort or pain, and is often the means of first directing the attention of the patient to the difficulty. Acids, sweets, heat, and cold all produce discomfort in the same manner that they do upon the sensitive dentine attending caries.

As the disease progresses, and the dentine becomes farther and more deeply invaded, it has been my experience that the discomfort arising from hyperesthesia grows less. This is particularly true in the teeth of those at or past middle life.

Some two years ago, during a discussion which followed the reading of a paper by Professor Edwin T. Darby, before the Odontological Society of Pennsylvania, upon "Caries at the Gum-margins of Teeth," Professor James Truman advanced the idea that erosion is probably due to the solvent action of acid mucus, secreted by the follicles situated in the labial mucous membrane, and that the disease is more active at night from the fact that during sleep the flow of alkaline secretions from the salivary glands is arrested: hence the acid secretion of the mucous follicles is not neutralized to the same extent, if at all, as during the day-time, when the salivary secretion is active. In support of this idea Professor Truman stated that he had caused tests to be made with litmus-paper of the labial mucus in the mouths of patients suffering from erosion, by the patients themselves, immediately upon wakening, and each time had found a distinctly acid reaction, and he was led therefore to believe that the disease is to be accounted for upon that ground. The idea that erosion is due to some sort of solvent action has been held and frequently expressed, and as the secretions of the mouth when carelessly tested are as likely to show an alkaline reaction as an acid one, the opinion has been advanced that alkalies in the saliva act upon the enamel of the tooth and produce erosion. This, however, is easily disproved by subjecting teeth out of the mouth to alkaline solutions.

Professor Truman's experiments establish the fact that teeth so treated undergo no solution or disintegration whatever, after many months' contact with the alkali. As tests which I had formerly made during the day-time had generally failed to show any evidence of acidity of the oral secretions, and impressed by the importance of the suggestion of Dr. Truman, I repeated the litmus tests, and had patients affected with erosion do the same, under the conditions proposed by him,—viz., blue litmus-paper was to be placed between the incisor teeth and lips, immediately upon wakening and before the salivary secretion has commenced to flow. The papers returned to me for examination were without an exception reddened, thus giving unmistakable evidence of having been in contact with an acid. Repetition of the test by simply moistening the paper with the labial mucus, while the patient was in the office, generally failed to show any variation from neutrality in reaction. By making the tests with proper precautions, however, results are obtained which are decidedly different from those just mentioned. The method pursued is as follows: After the mouth has been rinsed with water, all adherent mucus and saliva is carefully wiped from the labial mucous membrane with a soft napkin. A double fold of dry napkin is then to be placed over the eroded teeth, and a piece of

moistened blue litmus-paper sufficiently large to embrace the whole area of erosion is placed upon the napkin, after which the lip is to be firmly held down upon and in contact with the litmus-paper for a full minute.

Upon removing the paper it will be found to be distinctly reddened, but the change of color is not uniform over the entire surface, and I desire to lay particular stress upon the appearance presented by the paper after the test is made in the manner just described. It will be found that a series of red spots, corresponding in number and position to the orifices of the labial mucus follicles, are dotted over the paper, which after a short time spread, through absorption of the acid, and coalesce to form reddened areas which bear considerable resemblance in configuration to the eroded areas upon the teeth. When thus performed the test yields a graphic representation of the position and arrangement of those mucous follicles in the labial mucous membrane whose secretion is acid. Much depends upon the delicacy of the litmus-paper employed in the test. Ordinary blue litmus is nearly always alkaline, from the fact that, as it comes in commerce, the coloring matter in the form of an extract is mixed with clay or some kind of earthy matter, which renders it alkaline and impairs its sensitiveness to very weak or dilute acids.

In the preparation of blue litmus-paper for testing the oral secretions care must be taken to render it neutral. This may be accomplished by dividing the litmus solution prepared by the method directed in the U. S. Pharmacopœia into equal portions, and adding to one portion just enough dilute sulphuric acid barely to make it red, and mixing it with the other portion. Swedish filter-paper, or any pure unsized paper, free from alkali, soaked in such solution, and dried, will furnish litmus-paper of extreme delicacy. The litmus-papers made by E. R. Squibb, of Brooklyn, fully meet the requirements of sensitiveness and convenience. Before using the paper it is best to moisten it with water, and remove the excess with blotting-paper, by which a more rapid absorption of the somewhat viscid mucus is secured. The secretion of acid mucus in cases of erosion is purely local in its expression, and the position and extent of the surface secreting it defines the extent of the lesion which involves the teeth. Its localization may be readily verified by repeating the litmus test upon other portions of the oral mucous membrane. Thus, it will be found that while the mucous membrane immediately overlaying the eroded area is decidedly acid, the secretion from the palatine mucous membrane will frequently be alkaline. In fact, this is the ordinary state of affairs in the cases which I have had opportunity to examine, the reaction



of the mucous membrane generally being neutral or alkaline in all positions with the exception of that contiguous to the eroded teeth.

Thus far my observations have been confined to the mucous membrane lining the oral cavity, but from the character of some cases of erosion, particularly those in which the cutting edges of the incisors are markedly involved, it would seem to indicate a like condition of acidity of the mucous secretion at the tip of the tongue. This is a matter to be decided by future investigation.

The character of the eroded surfaces is a matter of interest from the highly polished condition which they exhibit. This question of polish is, I think, purely a physical matter, which depends largely upon the density or morphology of the tissue acted upon, and the rapidity of the solvent action, which latter is determined to a great extent by the amount and acidity of the morbid mucus.

Thus, in teeth of loose or frail structure, such as we are accustomed to speak of as "chalky teeth," the polished surface of erosion can scarcely be said to exist, and is only manifested in the highest degree in dense, hard teeth.

I can perhaps illustrate one phase of this question by this piece of French plate-glass, one end of which has been dipped in a solution of hydrofluoric acid; the other end has been exposed to the action of gaseous hydrofluoric acid and etched dry, while the middle portion has been completely protected from the action of the acid, and retains the high polish which has been given to it mechanically. I would call your attention to the peculiar luster which is exhibited by that portion etched by the liquid acid. For, while the surface is irregular as compared with that mechanically polished, yet it has a smoothness which gives it almost a greasy or oily feeling, and is in many respects similar to the surface in some instances produced by erosion. That portion of the plate etched by the dry gas is frosted in appearance, from the more energetic action of the acid. Though the solvent in both cases is the same, yet the physical results differ because produced under different conditions.

As having a direct bearing upon the reaction of the oral fluids in erosion, I have observed a marked freedom from calcareous deposits upon such teeth; in fact, I have never seen a tooth, the subject of extensive erosion, where the disease was active, that had a deposit of tartar upon it. Extensive deposition of tartar, so far as my personal observation goes, is always attended by a neutral or distinctly alkaline reaction of the oral secretions.

As to the cause of this circumscribed, local variation from the normal reaction of the secretion of certain portions of the labial mucous membrane, I am unfortunately unable to furnish any explanation even worthy of the name of a theory.

I have observed, however, that in all cases I have examined the temperamental condition was markedly nervous. The patient may be plethoric or anemic, yet the nervous element predominates, and there is a marked tendency to neuralgia, nervous dyspepsia, gout, rheumatoid-arthritis, etc.

Whether it is the expression of a systemic vice or the local morbid manifestation of a perverted nerve-function, or whether it be the result of some idiopathic or hereditary neurotic taint, are questions which remain to be solved. That erosion of the teeth is caused by the solvent action of the acid secretions of certain mucous follicles in the buccal mucous membrane, and is in no way *dependent* upon mechanical abrasion, is to my mind, at least, conclusively proven. The treatment of the local condition which I have adopted, based upon the investigations which I have made and just described, is, where the disease has progressed so that the dentine has become denuded, to fill the depressions or grooves with gold, which must for this purpose be soft and kid-like. The patient is directed to use lime-water as a mouth-wash during the day, and make applications of pure precipitated chalk at night immediately before retiring. The chalk is applied by dipping the moistened finger-tip into the powder and rubbing it on and around the necks of the teeth, where it is allowed to remain all night. When pursued systematically and conscientiously, I am convinced that this treatment absolutely prevents further progress of the solvent action of the acid mucus upon the teeth.

#### *Discussion.*

Dr. Dwinelle. I think, Mr. President, that the paper just read is good orthodox doctrine, so far as we can establish any theories in reference to erosion of the teeth. As is well known to this association, the theory which has been advanced here is one of many. The subject has puzzled our profession probably more than any other, but I am inclined to think that, so far as we are at present able to give an explanation, it has been given to-night, at least to a large extent. The attrition of the tooth-brush does not account for the erosion, because transverse grooves are found in the teeth of those who brush them vertically, and vertical grooves on the teeth of those who use the brush transversely. I referred to a case not long since before this association wherein the grooves, or markings, or figures of the erosion were in every possible direction; therefore the mechanical theory of the brush, or of any mechanical abrasion, will not account for the erosion. That it is chemical I have no doubt. That the secretions of the mouth are constantly changing and gravitating towards an acid condition is a matter that we are all familiar with

and accept. The chemical theory in reference to medicinal substances taken into the mouth has been, I think, very clearly and satisfactorily explained before the Odontological Society, in a paper read by Dr. G. W. Weld as to the action of hydrochloric acid upon the teeth. From my experience I have no doubt that erosion is chemical rather than mechanical. Further than this, I am inclined to another theory which will perhaps need further development to establish, and which is that a certain amount of absorption takes place, and that erosion is a process of or is induced by absorption. I referred, in a little address I made before the association not long since, to the fact that the human system is capable of being brought into a condition where evident and manifest absorption of the material of the teeth takes place. I cited a case where a man had been constitutionally affected by the iodide of potassium to that extent that his teeth were abraded near the gums horizontally across, even into the very depths of the pulp, so that their vitality was destroyed. In this instance I explained to the patient that the trouble in his case had been induced by his being brought under constitutional treatment of the iodide of potassium, which he admitted to be the fact. A friend of mine, a chemist, was in an adjoining room, and I called him in to examine the case, and asked him what he thought was the cause of it. He at once said the patient seemed to be under the constitutional effect of the iodide of potassium, and that this portion of the teeth had been absorbed in consequence of his being in that chemical condition, so to speak. I referred at this time to the fact that our chemical condition is constantly being changed; that our secretions are sometimes acid, sometimes alkaline, and at other times saline. It is possible for us to be brought into a condition through chemical changes within our system to correspond to the known effects of the iodide of potassium. The iodide of potassium, as we all know, is a strong stimulant to absorption, inducing the removal of abnormal deposits in any portion of our systems, and it will also remove by absorption portions of our teeth. Why it seizes upon this particular part of the teeth is a conundrum that is to be resolved in the future.

Dr. W. H. Atkinson. Gentlemen, I first wish to thank both the gentlemen who have presented the papers to-night, before saying that either one of them, to be properly handled, would consume more than the time of a session of this body. I would thank Dr. Meriam for the very labored presentment he has made to us, indicating that he had given the subject great attention; and I trust that we will be able to derive benefit from the hints he has given us as to the uses of gutta-percha. He has not commended it as a permanent filling merely, but as a means of crutching our limping



efforts over difficult cases, and in that I indorse it. I want to congratulate Dr. Kirk upon the honesty and faithfulness of the presentment that he has made. He indicates in beautiful, chaste language a well-trained mind, and that he has had opportunities that were not common when I was of his age. As to any conclusions, I perceive that he has only made one that seems to be final. And I want to recommend any one, old or young, to be careful about making finalities of conclusions. Sometimes the first blush of the interpretation of the appearances that present themselves to us will be the truth in its cleanness and righteousness, and at other times we take partial presentments and make a conclusion as if we had surveyed the entire ground. I have already excused myself from going deeply into the papers. I have something more in my mind that is not just exactly as well established in the minds of men as it ought to be. I want to hit right between the frontlets the disposition on the part of men in positions that would entitle us to expect sound doctrine from them of playing the Mugwump and throwing cold water upon everything that is new, for fear that their positions will be endangered. That is downright cowardice or baldheaded ignorance, one or the other.

I made the motion to-night to invite Dr. Younger to present his method of transplanting teeth in new sockets before this body, at a special meeting to be appointed for that purpose. I had a purpose in that. It was this: that if I have any idea of physiology, of nutrient activity, of pathology and the means of controlling it, I think we are infinitely better off to drill an alveolus into an already healed jaw or other bone where teeth have been removed, and where there is abundance of coagulative tissue, myoline, and embryonal structure, out of which to get a formation to make a new growth that shall adhere to the tooth that is inserted there, than to replant in old sockets; that theoretically it is sound, whatever it is practically.

I would not look for very good results without breaking up the connective tissue that constitutes the membrane, the lining of the socket, and the covering of the root of the tooth. I doubt if any surgeon would re-insert a tooth that had been extracted without breaking that up. That is based upon old discoveries in pathological activity. It is the very inception, and base, and first letter of the alphabet of pathological action,—and we owe it to Carl Heitzmann,—the return to the embryonal condition of the tissues in the locality, so that they can be in the plastic state from which new growths take their rise, and which are said to be proved by this operation in California. We have had a pretty good example to-day. I have said that we owe it to Carl Heitzmann. We do owe

it to him, although he did not first discover it. Grand old John Hunter discovered that. He formulated the fact that inflammation is none other than the return of the tissues to their embryonic condition. It cannot be better stated to-day, with all the improved microscopes that we have, than old John Hunter said it, who did not have any microscope,—only that of the intellect and ability which led him to get at the truth as far as in him lay in every proposition brought before his magnificent mind.

There is only one question in regard to the tooth inserted to-day, and that is as to the compatibility of the tooth,—the morphological character and constitution of the tooth that was inserted with the protoplasmic and molecular condition and the blood crisis of the patient for whom it was inserted; whether there be any incompatibility between the morphology of the two persons; and then whether there was any deterioration in the part or the person from whom the tooth was received. I should be very desirous of having the connective tissue that constitutes the pericemental membrane in good condition for the reception of the tooth, or else I should snip it at the end. I should be careful to extirpate all the pulp in the pulp-chamber and have the pulp-chamber hermetically sealed. I have confidence enough in the practical knowledge of Dr. Younger to believe that he would not make such a mistake as to leave that open, *à la* Dr. Watt and others, who said they would just as lieve have the canal open after the extirpation of the pulp as to have it filled. This is not a new principle. There are no new principles; only new comprehension of truths that have been in existence since civilization. I hope Dr. Younger will have free course to do his level best for us.

President Carr. Gentlemen, we will now hear from Dr. Wm. J. Younger, of San Francisco.

Dr. Younger. Mr. President and Gentlemen: I have recently issued a small pamphlet which tells all that I know about this matter. There are some minor details, of course, that I have omitted because they would be too cumbersome. It is my purpose when I return home to investigate this matter further with the microscope, and try to see what light it will throw upon the subject; and it is in order to have my eyes in good condition and to have the time for this investigation that I have given up operating, and devoted myself entirely to this subject of transplanting or implanting teeth.

Implantation is, I think, far more likely to succeed than replantation or transplantation. It will be admitted that the chances for success are greater in implantation when we consider the conditions

in which replantation is effected. It is usually done either for the purpose of relieving a forming abscess or to abort such abscess. We remove the tooth, clean the socket, remove a portion of the roots, and then we place the tooth back into its position. We have not removed the disease, as a rule; we have simply modified its conditions, and it is very likely that absorption of the roots will result.

In transplantation we have a healthy root, but it is usually put into a cavity from which a diseased root has been removed. We have in this case a diseased socket and a healthy root.

In implantation we have a new and healthy socket, and a healthy tooth. The conditions in replantation are very similar to those in an old sore or an old wound where we cut the edges and bring the fresh surfaces together. The parts heal at once.

In the operation this afternoon I had certain things to contend with; and in my own office probably I would not have performed the operation. I had a splendid subject,—a good, brave fellow,—but the tooth was not as well covered with pericementum as I would like to have it. Yet I demonstrated the operation as an operation. I have very little doubt but that this operation will succeed, although the tooth had very little pericementum. It is wonderful what a strong grip a little pericementum has. In this case the pericementum was scattered along the tooth; not entirely at the end, nor at the neck, but some at the neck and some along the sides in different places,—enough to give it a hold in different locations. In the course of time there will be sufficient cement material deposited there to bind the tooth mechanically where the pericementum does not exist; then we will have bone-buds or odontoblasts, by which there will be formed a perfect union,—the same union that exists in teeth that have never been extracted.

If any gentlemen here who saw the operation this afternoon have any questions to ask about it I shall be very glad to answer them, especially for the reason that sometimes in these questions something new is presented to me by which I learn something myself.

Dr. G. W. Weld. I would like to ask Dr. Younger how many teeth he has implanted in this way, and how long a time they have remained?

Dr. Younger. My first operation took place, I think, on the 13th of June, 1885. I will say that in the case announced in my article where I put in four bicuspidis the lady celebrated the birthday of the bicuspidis by having a molar implanted also. She had been eating with them a year, and was thoroughly satisfied. She had worn a plate for thirty years. She uses them now the same as if they were her natural teeth. I removed a wisdom-tooth from her daughter's mouth that morning and implanted it in the rear of the second bicuspid on



the left side. Almost as soon as it was put in she commenced to eat upon it. Three weeks and a half after the operation was performed the tooth was perfectly solid, and has continued so.

Dr. W. H. Dwinelle. I would like to ask what your theory is in reference to this dry pericementum. I understand that this tooth which you implanted to-day had been out of the mouth some time, and the pericementum was dried. Is it your theory that this dry pericementum is in the nature of the dry seed which under favorable circumstances will spring into life and invite union afterwards?

Dr. Younger. The pericementum seems to possess a peculiar virtue of vitality which I cannot explain. But I would not hesitate to implant a tooth covered with pericementum that had been eight or ten years out of the mouth. I have a tooth now the record of which goes back six years. It is still covered with pericementum. It was removed in Valparaiso, South America, six years ago. It has good pericementum.

In the case of Mrs. Blankman, mentioned in the last article of mine read before the California State Dental Association, the tooth had been out of the mouth for thirteen months and eleven days, and yet attachment has formed as vigorously and quickly as if it had been a freshly-drawn tooth. The dentist who extracted it, on the 31st of January, 1885, came down from Sacramento on purpose to see and identify the lady and the tooth. I had the lady come to my office, and he recognized the tooth as having been extracted by him. So I had corroborative evidence, aside from the lady's own testimony and the appearance of the alveolus. This tooth had been knocked about in the casket and drawer for so long, and yet it is to-day alive and as vigorous as if it had been freshly drawn when it was implanted. In this case an accident occurred. Twelve days afterwards, in eating a crust of French bread, the tooth was so wrenched that the next morning I could move it from side to side, and it was quite loose, but it did not drop out. If there had been simply a mechanical union it would have dropped out; nothing could have kept it from dropping out. I did not even tie it at that time. I only told the lady not to eat upon that side. In the course of a week or ten days it became perfectly firm, and is now as firm as a rock. She presented herself at the meeting of the California State Dental Association, and they tried to pass instruments up alongside of the tooth, but could not separate the gum from the neck of the tooth. The tooth was so firm they could not budge it in any way, and the pain produced came from the gum and not from the tooth itself.

It is troublesome to keep teeth in cocks' combs, and that was the disheartening feature of the operation before we found it was

not necessary to preserve teeth in that way. We know now that it is simply necessary to keep the teeth clean and dry, allowing no moisture to touch them until they are to be used.

Dr. G. S. Meigs. Did you ever try the implanting of teeth that had no pericementum?

Dr. Younger. Yes; I tried a lower molar. The same lady I have spoken of had a lower molar which had been out about two or three years, and which she wanted implanted. I told her that there was no pericementum on the tooth, and that it was absurd to try, as it could not be successful. She insisted, and I performed the operation, simply for the purpose of showing the operation and to gratify the patient, and not with any idea of ultimate success. I prepared the tooth and inserted it. It seemed to be quite firm the first day, but there was no adhesion and no growth. I did not encourage the woman to retain it.

Query. Do you moisten the teeth before inserting them?

Dr. Younger. Yes. I always moisten the pericementum by placing the tooth in warm water. The one inserted to-day appeared like a freshly-extracted tooth.

Dr. Dwinelle. The fields of the West are covered with Egyptian wheat that sprung from kernels of wheat which had laid in the tombs of Egyptian mummies for four thousand years, and yet the seed after being planted in the soil, under favorable circumstances, has produced what is known as Egyptian wheat. This shows how long the vitality of a kernel of wheat can be retained. Here we seem to have an analogous case, in the pericementum of a tooth living indefinitely, or for many years, as suggested here to-night. Perhaps it may be so under favorable circumstances. That being the case, if I should go to some mummy, say that of old Pharaoh himself, take out one of his teeth and have it transplanted into my own head, I might then be enabled to wear an Egyptian tooth which was coeval with the Pyramids.

Dr. Younger. In that case I do not imagine you would have success. If Mr. Pharaoh's tooth had been extracted while he was living, and placed aside and kept as carefully as possible, then a possibility of success would exist; but surrounding decomposition would render success impossible. Teeth extracted from dead persons after molecular life has ceased to exist are not so likely to preserve their vitality as those that are extracted while the person is in the full tide of life or immediately after death.

Query. Do implanted teeth discolor by age?

Dr. Younger. No. They seem to take in time the same color the other teeth have. What that is due to I do not know. I have noticed that teeth which when put in were very white would

after a week or two be toned down gradually until they assumed the color of the other teeth in the mouth. In the case of our patient to-day you saw how much whiter the inserted tooth was than the others. It will be interesting for you to watch that tooth as to its color. I am glad the patient happens to be under your surveillance all the time. The conditions were not as good as I could have wished; the tooth was not well covered with pericementum, and I was not able to perform the operation as well as I could have done it in my own office; still I have hopes for its success. Half an hour in my own office would have been all the time required for the operation, which took to-day an hour and a half, and the result perhaps would have been better than it is. This operation I am anxious should become an operation in general practice; and for that reason I am perfectly willing to do what your president has requested me to do,—that is, give another clinic before this society.

Adjourned.

B. C. NASH, D.D.S., *Secretary*.

### SOUTHERN ILLINOIS DENTAL SOCIETY.

THE Southern Illinois Dental Society was organized at East St. Louis, Ill., November 23, 1886. There was a good attendance, and all seemed in earnest for the work to be done in the society.

The following officers were elected: C. B. Rohland, president; T. W. Prichett, vice-president; G. W. Entsminger, secretary; N. W. Carter, treasurer; J. J. Jennelle, J. G. Dixon, and E. L. Spencer, executive committee.

The first regular meeting will be held in Duquoin, commencing on the first Tuesday in April, 1887.

G. W. ENTSMINGER, *Secretary*, Carbondale, Ill.

### EASTERN ILLINOIS DENTAL SOCIETY.

THE dentists of this section of Illinois met at the Arlington House, Danville, Ill., November 30, 1886, and organized the Eastern Illinois Dental Society. We start out with fair prospects of a good society, and hope to have every dentist of the sixteen counties assigned to the Eastern Illinois section by the State Society join us.

The next meeting will be held at Paris, Ill., on the third Tuesday of March next.

E. W. SHERIFF, Danville, Ill.



## LOUISIANA STATE DENTAL ASSOCIATION.

THE annual meeting of the Louisiana State Dental Association will be held in Tulane Hall, New Orleans, La., on the 23d, 24th, and 25th of February, 1887.

A cordial invitation is extended to members of the profession throughout the States to attend. No efforts will be spared to make our guests comfortable, and the meeting interesting and profitable. An opportunity to witness the Mardi-Gras festivities will be afforded those who come, and at the same time railroad rates will be more favorable. Mardi-Gras takes place the day before the meeting.

For further information, address

G. J. FRIEDRICHS, *Chairman Ex. Com.*,  
155 Carondelet St., New Orleans, La.

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EDITORIAL.

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## DENTISTRY NOT A SPECIALTY OF MEDICINE.

DR. NORMAN W. KINGSLEY has recently read a paper, in Philadelphia and elsewhere, in defence of the proposition that dentistry is not a specialty of medicine. While admitting that its practice must properly be considered a branch of the healing art, he contended that it was not a specialty or division of medical practice, and is not recognized as such. It would seem that neither argument nor illustration were needed to establish these positions. Yet, simple though they be, there is an apparent contradiction in the statements, which has led to misapprehension on all sides, and to needless irritation.

The confusion arises from a one-sided view of the subject. The general practice of medicine and surgery covers too wide a field for any one man to occupy, and its division into specialties necessarily results. The difference between the other specialties and dentistry is that the practice of the former has been based on a medical degree, while dentists have established colleges and conferred simply dental degrees. We believe that all self-respecting dental practitioners are satisfied with this degree, or, if not, they seek the medical degree in addition.

It has been assumed, however, that dentists as a class have sought a recognition of the medical profession as doctors which physicians as a class have refused to concede. We do not believe that such recognition has been formally asked or expected, nor is there the slightest reason that dentists should ask, desire, or expect formal association with a profession with whose terms of membership they have not complied. A layman may excel in

learning, in oratory, in piety, in every essential of a Christian minister, and the fact may be acknowledged by all who know him; but unless he complies with the conditions which have been prescribed as necessary to fellowship he should not complain that he is ranked as a layman and not as a clergyman. A gentleman may have made himself more familiar with law than the average judge on the bench, but he does not rank as a lawyer unless he has been formally admitted to the bar. And so a dentist may be thoroughly familiar with the teachings of every chair in a medical college; may be every way better qualified for the practice of medicine than the average, nay even than the best, doctor; but nevertheless he is not ranked as a physician unless he has complied with the requirements of a college authorized to confer the degree of doctor of medicine. The talk of being disowned, of being left out, and all that sort of thing, is worse than idle. The individual man who thus complains is bound to acknowledge that he never made formal effort to be taken in by regular method. He is simply left outside the medical pale precisely as all the rest of the world who are not in have been left out—because he has not met the requirements for admission. And if the complaint is that dentists as a class, calling, or profession have not been placed on a footing with graduates of medicine, neither have clergymen, lawyers, architects, artists, nor sculptors as such. These professions all have as much room for complaint as has the concrete dentistry, except for the claim, which is undisputed, that dentistry is a branch of the healing art. The term “non-recognition,” so often heard, is sometimes used as though non-recognition implied disrespect if not contempt; as though medical practitioners assumed that they were superior to the practitioners of dentistry. It is time that all such imputations and inferences were done away with. The folly of all talk or feeling of this character will be evident by simply “turning the tables.” Would any dental society, requiring the possession of a dental degree as a qualification for membership, accept the degree of M.D. in place of D.D.S.? or would any dentist agree to a formal consultation with a physician regarding the best treatment of an exposed pulp or other purely dental trouble? Assuredly not! Nor would the physician be justified in using the term “non-recognition” invidiously because of such refusal. The rule works both ways, and justifies itself alike in either case. It is not a question of grade, but of class distinction.

There is a singular want of appreciation of these plain facts in many quarters where one would naturally look for a more discriminating judgment and a more self-respectful attitude.

If, now, it be asked, Should dentistry be taught and practiced as

a specialty of medicine? that opens another and different field of thought altogether, and, like many other questions, it may be acknowledged that there is much can be said on either side, and good may be accomplished by its thoughtful discussion.

The bearing of these observations upon the question of a dental section in a medical association or congress would seem to be that, while dentistry is "practically an independent profession," there is no valid reason why dentists should not accept an arrangement assigning them to a section in an otherwise purely medical organization. A courteous invitation to such position must be regarded as significant of a willingness to waive technical distinctions in the interests of science, and also as an appreciative and complimentary recognition of the close relationship of dentistry and medicine.

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### THEN AND NOW.

WE present our readers in this number with a translation of a little work which has recently come into our possession—the earliest volume of which we have knowledge devoted to the teeth, their diseases and treatment.

In "Dental Bibliography" the book is noted as having been published in 1536, the only allusion to it which has been found having appeared in a German medical journal issued about one hundred years ago. The title and place of publication proves to have been correctly given; the date, however, should have been 1541 instead of 1536.

We are confident that we are giving the work of the author to a wider circle of readers than it has ever had before, and, we doubt not, it will be read with even more interest than it excited when first published. The style is so quaint, the descriptions so peculiar, and the directions so droll, that we feel sure of the appreciation of our readers in affording them the opportunity of its perusal.

The explanation of a cause for loose teeth from humors from the head dropping down upon the gums is somewhat anticipatory of Dr. J. D. Patterson's theory of the pathological relation of pyorrhea alveolaris and catarrh (*vide* his paper read before the American Dental Association in 1885, and published in the DENTAL COSMOS for November of that year), while the recognition of "worms in the teeth" antedates by one hundred and forty-two years Leeuwenhock's discovery in 1683. (See Periscope of DENTAL COSMOS for June, 1884, page 381.) In view of these facts modern microscopists may afford to share their honors with Egenolff. In chapter V our author recommends the filling of hollow teeth with "gold leaves," though Harris is responsible for the statement that gold was first used as a



filling in the early part of the eighteenth century, and in the "History of Dental and Oral Science" it is stated that the writer had "not been able to discover any mention of it prior to that made by Fouchard in 1785." It may well be queried if there be anything new under the sun.

The book is in an excellent state of preservation, and the ink as black as jet. The antique German in which it was written made it difficult of translation, but we believe it has been intelligently and faithfully done. We have placed it in our bookcase beside "The American System of Dentistry" in illustration of *then* and *now*.

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### TWO NEW DENTAL JOURNALS.

THE first and second numbers of *The Dental Review* are before us. It is devoted to the advancement of dental science, and is published monthly for the "Dental Review Company," No. 96 Washington street, Chicago. Its editorship is impersonal. Price, \$2.50 per annum. It is well printed, on good paper, and the first two numbers are filled with good matter.

We have also received an announcement of the issue, January 1, 1887, of another new monthly dental periodical, to be called *The Western Dental Journal*. It is to be published by R. I. Pearson & Co., Kansas City, Mo., and edited by Dr. G. D. Patterson, assisted by Dr. A. H. Thompson, of Topeka, and Dr. C. L. Hungerford, of Kansas City. The subscription price is \$2.00 per annum.

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### DISCONTINUANCE OF A DENTAL JOURNAL.

THE December number of *The Dental Practitioner* announces the discontinuance of that journal for the present.

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### THE OUTLOOK.

THE outlook is good for the fulfillment of our promise to make the volume of the DENTAL COSMOS for 1887 eclipse if possible its predecessors. An unusual pressure of interesting matter meets us at the beginning of the New Year, and we have been compelled to add an extra form of eight pages to this number, making seventy-two pages of reading of paramount interest to every dentist. Even with this addition, we still have articles in hand and in type for the next issue.

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### FIRST DISTRICT DENTAL SOCIETY.

THE programme for the Eighteenth Anniversary meeting of the First District Dental Society of the State of New York has been forwarded to us for publication. We are requested to say that any dentist who has not received a direct invitation is solicited to con-

sider himself as personally addressed by this general notice, and is assured of a cordial welcome. Those who desire further particulars may apply to Dr. W. W. Walker, chairman of the executive committee, No. 67 West Ninth street, New York. The programme is as follows :

*Monday Evening, January 17, 1887.*

*Prayer*, Brady E. Backus, D.D., New York.

*Address of Welcome*, Dr. Wm. Carr, New York.

*Response*, Dr. J. Taft, Cincinnati, Ohio.

#### PAPER.

James Truman, D.D.S., Philadelphia, professor of dental pathology, therapeutics, and materia medica, University of Pennsylvania. Subject: "The Rational Basis of Practice."

*Tuesday Evening, January 18, 1887.*

#### PAPERS.

Norman W. Kingsley, D.D.S., New York. Subject: "Critical Essay on Treatment of the Irregularities of the Teeth."

J. Rollo Knapp, D.D.S., New Orleans, La. Subject: "Crown and Bridge-work."

During the Anniversary short and interesting Papers will be read by the following gentlemen:

Frank French, M.D.S., Rochester, N. Y. Subject: "What Caused It?"

A. P. Southwick, M.D.S., Buffalo, New York. Subject: "Imperfections in Vulcanite Work."

T. D. Shumway, D.D.S., Boston, Mass. Subject: "A Monograph—Science and Dentistry."

A. M. Dudley, D.D.S., Salem, Mass. Subject: "Dentistry as Practiced by the Native Dentists of China and Japan." (Illustrated.)

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P. S. On Monday and Tuesday evenings Dr. J. Rollo Knapp will exhibit his Electric Light for Illuminating the Oral Cavity.

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#### CLINICS.

Clinics will be held at the New York College of Dentistry, Second avenue and Twenty-third street, commencing at 10 A. M. and 2 P. M.

The names of the Clinical Operators will be announced the previous evening, as the committee desires *them to select their day and hour.*

*Tuesday, January 18, 1887, 10 A. M.*

Sophy E. Feltwell, D.D.S., Pittsburgh, Pa. Artificial Crowns.

Olga Neymann, D.D.S., New York. Gold Filling.

J. Rollo Knapp, D.D.S., New Orleans, La. Crown and Bridge-work; Carbon and Nitrous Oxide Blowpipe.

E. Parmly Brown, D.D.S., Flushing, Long Island. Porcelain Crown and Bridge-work; Electric Mallet, etc.

W. W. Evans, D.D.S., Washington, D. C. Artificial Work; Dylonite Lined with Aluminium; Operating with Engine-Plugger; Contour and Difficult Bucal Cavities.

D. A. Williams, D.D.S., superintendent mechanical department, New York College of Dentistry. Modified Interdental Splint.

Truman W. Brophy, M.D., D.D.S., professor of oral surgery, Chicago College of Dental Surgery, will practically Demonstrate the use of his Continuous band Matrices.

W. G. A. Bonwill, D.D.S., Philadelphia, Pa. Clinical Demonstration of the Use of Amalgams.

A. W. Harlan, M.D., D.D.S., professor of materia medica and therapeutics, Chicago College of Dental Surgery. Treatment of Pyorrhea Alveolaris.

H. C. Register, M.D., Philadelphia, Pa. Uses of Compressed Air in Dental Practice and Atomization—a Means for Cleansing the Mouth and Teeth.

E. T. Starr, D.D.S., Philadelphia, Pa. Detachable Bridge-work, etc.; Covering Gold Plates with Gold Foil.

S. H. Guilford, A.M., D.D.S., Philadelphia, Pa., professor of operative and prosthetic dentistry, Philadelphia Dental College and Hospital of Oral Surgery, will explain and Demonstrate the Use of his Matrices.

Wm. Crenshaw, D.D.S., Atlanta, Ga. Contouring Bicuspid and Molars; Using Electric Mallets and Perry's Separators.

Edwin T. Darby, M.D., D.D.S., Philadelphia, Pa., professor of operative dentistry and dental histology, University of Pennsylvania, will Clinic. Subject not given.

C. F. W. Bodecker, M.D.S., D.D.S., New York City, will Demonstrate the Preserving, Cutting, and Mounting of Microscopical Specimens.

R. Walter Starr, D.D.S., Philadelphia, Pa., will show the Removal of a Live Pulp and Nerve with Dental Engine-drill—using an Obtunder.

John H. Meyer, D.D.S., New York, will put through a Continuous-gum Case from the Impression.

M. L. Rhein, M.D., D.D.S., New York. Herbst Method in Conjunction with Electric Mallet; Herbst Method of making Loop Matrices of German Silver.

C. E. Timme, D.D. S., Hoboken, N. J. Herbst Method—using Wolrab Foil.

W. Irving Thayer, M.D., D.D.S., Brooklyn, N. Y., will Demonstrate the Use of his Trip-Hammer Plugger.

Dr. F. P. Geran, Brooklyn, New York. Herbst Method, etc.

W. H. Atkinson, M.D., D.D.S., New York. Implantation.

Frank Abbott, M.D., New York, professor of operative dentistry in the New York College of Dentistry, will Demonstrate his New Automatic Mallet with Back-action Attachment.

Dr. Safford G. Perry, New York, will Demonstrate the Perry Separator.

H. A. Parr, D.D.S., New York. Specialties in Bridge and Crown Work.

Dr. George F. Reese, Brooklyn, New York, will practically Demonstrate the Use of Reese Metal in the different Branches of Dentistry.

J. N. Farrar, M.D., D.D.S., New York, will explain Regulating Devices constructed to act upon the principle of Intermittent Force.

Frank D. Gardiner, D.D.S., Philadelphia, Pa. Electric Mallet—Practical Demonstration.

The S. S. White Dental Manufacturing Company has kindly consented to exhibit all its new devices and products.

Dentists are invited to bring Specimens, Models, New Appliances, Instruments, etc.

Special arrangements have been made with Messrs. Mathews & Piersons, proprietors of the Sturtevant House, Broadway and Twenty-ninth street, where full board can be obtained for \$3 per day, and lodgings for \$1 per night.



## BIBLIOGRAPHICAL.

GARRETSON'S WORKS, including "Odd Hours of a Physician," "Thinkers and Thinking," "Hours with John Darby," and "Brushland." Specially bound in neat vellum cloth, with gilt top and round edges. Put up in sets of four vols. 16 mo. Philadelphia: J. B. Lippincott Co. Price \$5.50.

The J. B. Lippincott Co. have recently reissued, in a beautiful library edition of four volumes, the literary works of Dr. J. E. Garretson ("John Darby"). These several productions have been noticed in the DENTAL COSMOS as they successively appeared, but attention is again called to them in their new form as the miscellaneous essays of one who has made his name familiar in the dental profession as author, teacher, and clinician.

Dr. Garretson has, however, taken rank not alone as a physician and surgeon, but as a practical philosopher, combining in his records of odd thoughts in odd hours amusement, learning, wit, and wisdom. His style is familiar and pleasing, and, considering a great diversity of topics, he brings to their discussion such a fund of curious lore that one may not peruse these volumes without instruction and entertainment.

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## PUBLISHER'S NOTICE.

### THE DENTAL COSMOS FOR 1887.

EVERY reader of the DENTAL COSMOS must have observed how closely its pages have been devoted to matters strictly within the sphere of dental science. Hence it happens that the Cosmos has come to be considered part and parcel of dentistry; its several volumes embodying the cotemporaneous history of the steady development in theory and practice.

Any English-reading dentist who elects to dispense with its companionship and enlightenment may not reasonably complain of want of success. He ought not to find fault for being left behind by his more thoughtful, appreciative, and discriminating fellow-practitioners, of whom many testify that each number of this journal is worth more to them than the cost of a year's subscription.

We expect to make the circulation of the DENTAL COSMOS for 1887 far greater than in any previous year. But this is a small part of our intent. We hope to make it more valuable than any preceding volume, and *that* will be much more difficult of accomplishment.

We ask that subscriptions and renewals be made promptly. A blank for that purpose will be found opposite this page.

THE S. S. WHITE DENTAL MFG. CO.

THE  
DENTAL COSMOS.

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VOL. XXIX.

PHILADELPHIA, FEBRUARY, 1887.

No. 2.

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ORIGINAL COMMUNICATIONS.

CROWN AND BRIDGE-WORK.

BY J. ROLLO KNAPP, NEW ORLEANS, LOUISIANA.

(Read before the First District Dental Society of the State of New York, at its Eighteenth Anniversary Meeting, January 18, 1887.)

MR. PRESIDENT AND GENTLEMEN: Appearing before you to-night by invitation, it is my province to endeavor to engage your attention for a while upon a subject towards which are directed the thoughts and researches of many of the foremost men of our profession. Probably no single topic in the busy domain of dental art is to-day receiving so earnest and thoughtful attention of the profession at large as that of crown and bridge-work. For the past few years, and I might say particularly for the past few months, even a casual reader of our various dental periodicals cannot fail to have observed the large amount of space devoted to treatises upon this important theme. It has doubtless been discussed in its expansive and multifarious bearings by all the dental societies, capital and provincial, central and isolated, throughout the length and breadth of this land, as well as in foreign countries. It is, therefore, not to be wondered at that this most prominent, most enterprising, and most progressive among the dental societies of the world should have given this subject distinguished consideration in its councils. It is not strange, then, that before leaving my far distant home in the South I should have had many misgivings as to my ability to respond to your kind invitation in such a manner as to adequately present *such* a subject before *such* a body of men. The compliment, however, of being called upon by you is a strong incentive for me to do my best, in the hope of being favored with your kind indulgence.

It would be a profitless consumption of your valuable time to discuss the early history of crown-work, with its divers claimants of originality, or even to attempt a *résumé* of the various devices and processes invented or adopted by subsequent investigators and

workers in this interesting field. A perusal of the recent edition of Dr. Richardson's instructive and suggestive work on "Mechanical Dentistry" has doubtless surprised many who had not kept pace with the progress being made in this branch of dentistry. The descriptions of the great variety of crown-work which he has given could hardly have been expected except by the most aspiring, the most observant, and the most laborious of the profession.

That which I deem most pertinent to the present occasion will be limited to a few words on the general principles of crown and bridge-work, and a brief description of my own methods and processes in executing it.

Of all the forms of substitution yet devised, that known as crown and bridge-work, when executed with judgment and skill, is the most valuable. For natural appearance, comfort, and stability it is unapproached by any other. Freeing the patient, in many instances, from the necessity of a cumbrous and annoying plate, it subserves far more advantageously the processes both of mastication and articulation. Skill of the highest order, as well as good judgment, is, however, imperatively demanded for the attainment of the best results. The lack of the necessary qualifications has tended, unfortunately, in too many instances, to bring into undeserved disrepute this meritorious system. Overzealous, insufficiently experienced aspirants have placed collars over unprepared roots, leaving unobserved gaps for the accumulation of deposits of food-débris, broken-down tissue, and other offensive matter. How could satisfactory results be expected? Injudicious tamping or malleting, in cases of predisposition to pericemental inflammation, and the clumsy use of excising forceps in the removal of protruding portions of crowns, have caused unfavorable results that ought to have been avoided. Insufficient care to prevent subjection to undue pressure upon occlusion, neglect of provision to secure efficient action in mastication, and lack of regard of the requirements of approximal support in the dental arch, have all, singly and in combination, proved other fruitful sources of failure. If we were to add to these the alleged practice of inserting crowns on roots not merely pulpless, but extensively softened, denuded in consequence of absorption of the surrounding alveolus, and loose in consequence of extensive destruction of the investing membrane, we should have a combination of evil practices sufficient to bring into disrepute the most meritorious system that could possibly be devised by man. These considerations need not here be dwelt on. They could have reference to none but the grossly incompetent or the unprincipled.

The ingenious devices for the construction and attachment of artificial crowns now at the command of the profession render it



practicable to save thousands of roots that would formerly have been peremptorily sacrificed. The aid in this valuable conservative practice to be derived from the advanced therapeutics of our day will, of course, be acknowledged and conscientiously employed. How gratifying it must be to thoughtful practitioners to contemplate the science and art of dentistry firmly established on such a plane of promise as this suggests! Not that any one will pretend in these days to ignore the irresistible evidence that methods of repairing and replacing decayed and lost teeth were well known and practiced in ancient civilizations! For, what Martial says of a Roman surgeon-dentist—*Eximit aut reficit dentem, Cascellius, ægrum*—and of the beauty, Ægle, with her purchased denture of bone or of Eastern ivory, though not exactly trite or hackneyed, is by no means recon-dite knowledge. And profound scholars have assured us that history in far more ancient records bears conclusive testimony to the same effect.

This, however, detracts not a tittle from the strides which moderns have made in odontological investigations, although it may stimulate to yet greater zeal and subdue to greater patience. How much of this virtue is needed in the branch of dentistry on which you have permitted me to address you to-night is known to all who have directed their efforts towards scientific crown and bridge operations.

A proper therapeutic preparation of the root is the initiatory step in this kind of work. Upon this the future success of the undertaking will in large measure depend. Its importance cannot be overrated. To the neglect of it I confidently attribute a considerable portion of such failures as have occurred. Taking it for granted that this initiatory treatment has been duly attended to, the mechanical manipulation of the root requires no less skillful and earnest care. With properly chosen corundum-wheels, using coarse-grained ones in the beginning, even considerable portions of protruding crowns should be rapidly removed, as they can very effectively be, on a line, or nearly so, with the gingival border, without the use of excising forceps. With suitable scalers the cervical portions of the enamel should next be removed, so as to leave the peripheral cementum with walls slightly bevelled. The root-trimmers or reducers suggested by Dr. R. Walter Starr will be found of great service in the accurate performance of this work. Then, cutting a strip of what we know so well as "collar gold" (prepared by The S. S. White Dental Manufacturing Company), twenty-two carats fine, twenty-eight standard gauge, of such a width as to permit of easy manipulation, a band should be fitted with long-nosed pliers and clasp-benders (McKellops's pattern) *directly* to the root. After the

band has been lapped and soldered, the seam and the gingival border carefully bevelled, the collar or ferrule thus formed should be gently forced over the neck of the tooth and well under the free margin of the gum, but not far enough to fret the connective-tissue. The collar being now removed, its gingival border must be carefully filed so as to adjust it exactly to the various inequalities existing in the borders of the alveolar process and its investing gum. The other border should then be evenly filed down so as to reduce the collar to the requisite narrowness. A piece of pure gold plate, gauge thirty-four, is now to be soldered upon this latter border so as to convert the collar into a cap for the root. This cap must have pierced in it such an aperture as will conform to the configuration of the pin or dowel best suited to the particular case in hand. Cap and pin, waxed together, should then be tried in the mouth, carefully removed, invested in calcined marble-dust and plaster, and soldered. Being again placed upon the root, an impression of it should be taken, as well as of the two approximal teeth.

A set of small trays especially made for the purpose will be found very convenient for taking impressions for crown-work, Figs. 1 to 8. Plaster or modelling composition can be used in doing this. Upon its being ascertained that the cap, with pin attached, is in its proper position in the impression, a plaster cast can be obtained, which, with a cast of the occluding teeth, should be placed in an articulator.

From this point succeeding steps will differ according to the character of crown to be inserted. If it be an incisor, which is to have a porcelain front, a plain plate-tooth of suitable size, shape, and shade should be backed with pure gold, ground to position upon the anterior portion of the cap, and united to it by adhesive wax. The finer and final adjustments as to alignment, occlusion, height, and contour must be obtained in the mouth. Sufficient wax should be used to perfectly restore the contour and to produce the most accurate *knuckling* or adjustment of the approximal surfaces of the teeth. Too much stress cannot be laid upon this latter point,—one I fear not sufficiently attended to. Yet all the reasons for observing it in all other kinds of contour work are no less potent here. In this procedure pure gold of thirty-four gauge should be made to completely envelop the sides and incisive portion of the wax, including the edges of the backing and contiguous portions of the cap. All should now be invested, the wax removed by boiling water, drying effected by a gentle heat, and the resulting golden pocket filled with twenty-carat solder. The solder, previously cut in small squares, is to be dropped into the mouth of the mold, and sprinkled with a very little powdered borax,—repeating this process with the left

hand as fast as the solder is melted under the blowpipe while held in the right hand until the mold is quite filled. To accomplish this in the best manner the flame of the blowpipe should be quite intense, but at the same time exceedingly small.

The small and deep mold formed by the gold shell enveloped in the marble and plaster matrix has a very narrow opening, which

FIG. 1.



FIG. 2.

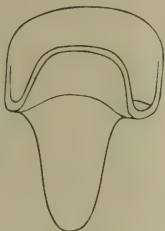


FIG. 3.

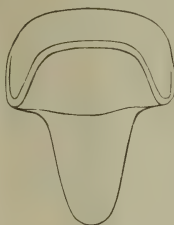


FIG. 4.



FIG. 5.

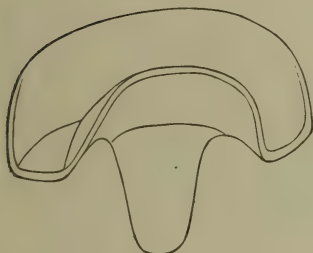


FIG. 6.

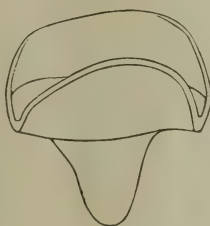


FIG. 7.

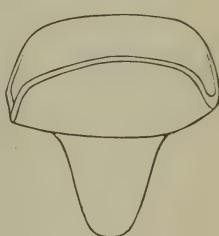


FIG. 8.

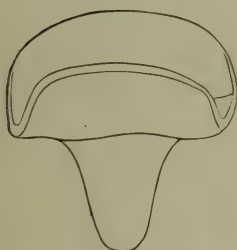


FIG. 9.



FIG. 10.



FIG. 12.



FIG. 14.



FIG. 13.



FIG. 11.



renders necessary an intense heat, capable of concentration upon and easy application to the innermost recesses of the mold, which is to be filled with molten gold. An oxyhydrogen blowpipe was therefore constructed to utilize the condensed nitrous-oxide gas in combination with common illuminating gas for the production of a mixture which is conducted through a thin rubber tube of one-eighth inch bore to a very small blowpipe, which emits a steady flow of constantly ignited gas in the form of a pointed pencil about a half inch in length by one-quarter of an inch at its greatest diameter.



With this blowpipe in hand, the plaster matrix may be speedily heated by playing the stream of fire over its surface until the mass is aglow, when the point of the flame is thrown into the mold by rapid thrusts until the solder melts like wax and fills every part of the mold with liquid gold. From the first application of the flame to the previously dried and warmed matrix, there is usually no more than ten minutes consumed in bringing the solder to the fusing point and completing the cast of gold in the little mold. It would seem that by such means only can the requisite heat be obtained, directed and controlled with the sensitiveness of adjustment that admits of the twenty-carat solder being melted in, yet without destruction of the thin gold crucible within the matrix. After cooling, removing investment, and boiling in acid, superfluous solder can best and most expeditiously be removed by corundum-wheels on the lathe. Care should be taken not to cut away the gold forming the approximal knuckling, and to artistically carve the palatal portion.

Fig. 9 represents a band of collar-gold, twenty-two carats fine, twenty-eight gauge; Fig. 10, a soldered collar or ferrule made from it; Fig. 11, a square gold pin, twenty carats fine; Fig. 12, a plate of pure gold, thirty-four gauge, for a cap; Fig. 13, the collar, cap, and pin duly invested. Fig. 14 represents the collar, cap, and pin soldered together with twenty-carat solder; Fig. 15, a lateral incisor plate-tooth, backed with pure gold, twenty-eight gauge, ground to the anterior portion of the cap, fastened to it with wax, contoured to represent a natural incisor, the approximal sides as well as incisive portion of which, together with the edges of the gold backing and contiguous parts of the cap, all enveloped in pure gold, thirty-four gauge. Fig. 16 represents the same, invested in calcined marble-dust and plaster, the wax removed, disclosing the golden pocket ready for the reception of the solder. Fig. 17 shows the crown after the soldering has been effected; Fig. 18, the lateral incisor crown, divested of superfluous solder and completely finished.

In constructing a cuspid, its natural palatal characteristics should be as accurately reproduced as practicable, Figs. 19, 20, 21, 22, 23. The formation of a porcelain-faced bicuspid is similar to that which has just been detailed up to the soldering of the backed tooth to the cap, Fig. 24. The subsequent stages, however, are very different. The perfect configuration of a bicuspid should be reproduced in wax, aptness of occlusion and knuckling being carefully attended to, Fig. 25. In this condition the crown should be placed in a small ring, such as is shown in Fig. 26, first set with wax in the desired position, and then secured there by plaster. The exposed portion of the crown and surrounding plaster should then be coated with sandarac varnish and molded in marble-dust and

glycerin, contained in a corresponding annular section, Fig. 27. Over this is to be placed a conical tube, such as is represented in Fig. 28, and into which molten zinc is to be poured. With the die, Fig. 29, thus cast, in accurately reproducing the natural cusps and sulci, there can be obtained with pure gold plate, thirty-four gauge, a perfect counterpart of the grinding surface of a bicuspid crown, Fig. 30. The palatal cavity of the impression thus made in the

FIG. 15.



FIG. 16.



FIG. 17.



FIG. 18.



FIG. 19.



FIG. 20.



FIG. 21.



FIG. 22.



FIG. 23.



FIG. 24.



FIG. 25.



FIG. 26.

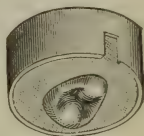


FIG. 27.



FIG. 28.

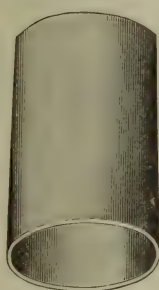


FIG. 29.



FIG. 30.



FIG. 31.



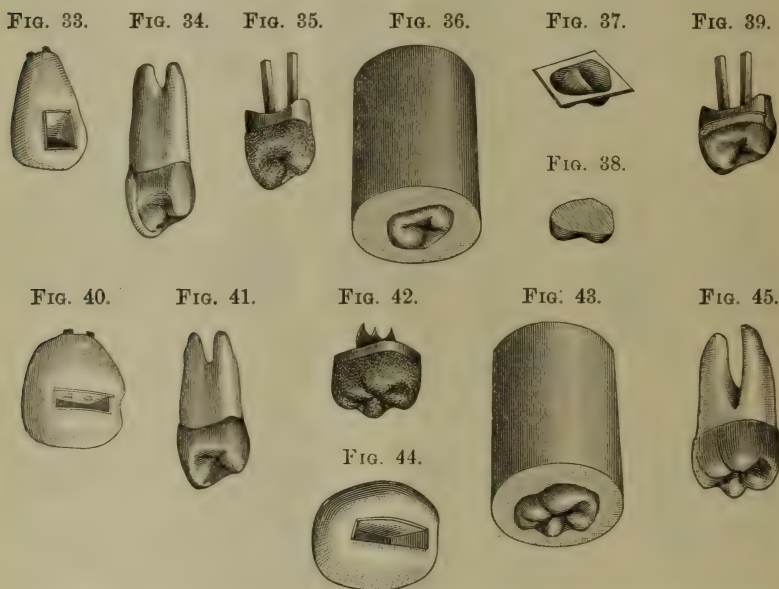
FIG. 32.



plate must now be filled with gold solder, twenty carats fine, after which the piece must be finished up by any requisite trimming. Care should be taken to leave the palatal cusp entire, and just enough of the buccal or external cusp to combine with the porcelain face in the formation of a proper occluding surface, Fig. 31. From the model, as represented in Fig. 25, sufficient wax must now be displaced to permit of the prepared gold cusps assuming their proper position, and the approximal surfaces remaining in the wax

then enveloped with pure gold, thirty-four gauge. The palatal portion of the collar must be protected with a strip of pure gold, twenty-eight gauge, one-sixteenth of an inch in width. All is now ready to be invested, Fig. 32. After removal of the wax, through the palatal aperture remaining, the internal walls of gold will be disclosed, Fig. 33. By careful manipulation with the small and intense blowpipe flame before mentioned, twenty-carat solder can be so flowed in as to make a solid golden mass, from which can be readily shaped a perfect bicuspid, Fig. 34.

In the construction of an all-gold bicuspid crown some of the steps differ from those just described. Upon the cap are dropped



several beads of wax. From this shapeless mass is carved a perfect bicuspid, Fig. 35. A die is then obtained, Fig. 36, after the manner just detailed. A grinding surface is swaged in pure gold, Fig. 37, and the cusps are filled with twenty-carat solder, Fig. 38, and placed in proper position upon the wax tooth. A piece of pure gold plate, slit at the edges for facilitating adjustment, should now be made to cover about two-thirds of the yet exposed border of wax, Fig. 39. After being invested, and the wax removed by hot water, a suitable aperture is left for soldering, Fig. 40. The resulting completed bicuspid, true to nature, is seen in Fig. 41. The descriptions just given answer for all-gold molars, Figs. 42, 43, 44, 45.

In carving the cusps and sulci, and in otherwise modelling the gold parts of the crowns, small engine corundum-wheels and points,



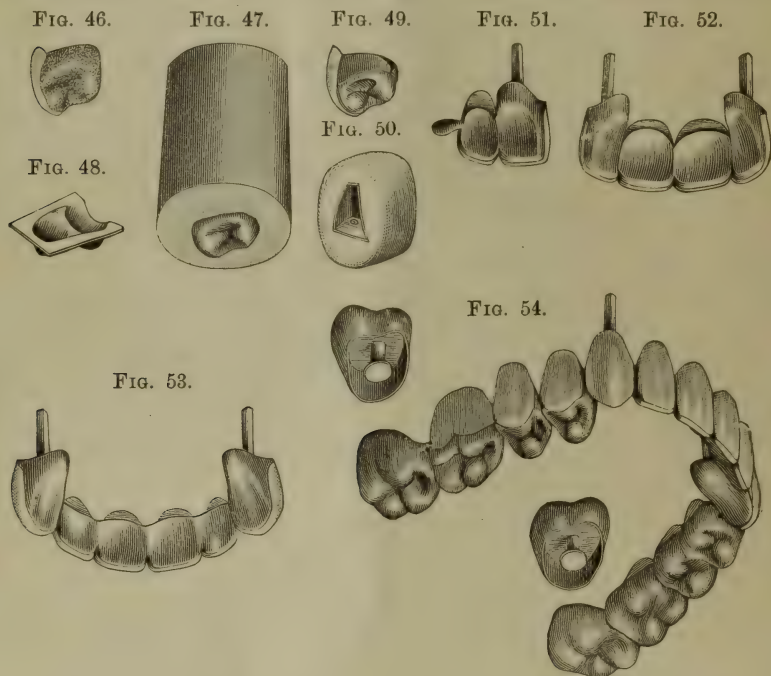
varying from coarse to fine, and barely moistened, to insure accuracy and delicacy of touch, are preferable to files or any form of steel instrument. The smoothing and polishing is done with wet felt-wheels, fine pumice, pulverized silex, moose-hide points with chalk, brush-wheels and whiting, and finally with rouge.

It is a matter of much importance that great care should be exercised in the preparations of gold used. The solders should be uniform, flow easily, and conform well in color to the work in hand. I have had enough experience in making my own solders to appreciate the superior, convenient, and reliable preparations for gold crown-work coming recently from The S. S. White Dental Manufacturing Co.'s establishment. In this connection, as so much depends upon the character of the porcelain teeth employed, I trust it will not be considered out of place for me to say that those manufactured by The S. S. White Company so fully meet all the requirements as to shape, color, strength, and resistance to the heat required in soldering, that they seem to leave nothing to be desired.

Bridge-work, which consists in the attaching of crowns without collars or posts to those possessing such supports, now demands our attention. Inasmuch as crowns are the beginning and the end of bridge-work, I shall merely indicate some methods of procedure different from those heretofore mentioned. Crowns without posts should be constructed especially with reference to cleanliness. In those instances in which it is admissible to allow them to come in contact with the gum, only the cervical porcelain tips should meet the gum, and the gold should recede, leaving self-cleansing spaces. Plain plate-teeth should be backed with pure gold and built up to the desired shape with wax, Fig. 46, which should be incased in pure gold as before described, Figs. 47, 48, 49. After investing and subsequent removal of the wax the resulting receptacle can readily be filled with twenty-carat solder, Fig. 50.

In the preparation and in the drilling of the roots, great care should be exercised to have the caps and the pins as nearly parallel as possible. Here, as well as elsewhere, sound judgment is essential to the accomplishment of the best results. For the attainment of accuracy, it is essential that an impression should be taken, preferably in plaster, of the caps in their proper positions upon their several roots. An impression should likewise be taken of the occluding teeth. The models obtained from these impressions should then be placed in an articulator as for plate work, and the articulating surfaces of the porcelain crowns should be carved in wax to a nicety. By the methods just mentioned these occluding surfaces are reproduced in gold. The requisite exercise of the dental organs and immunity from breakage of porcelain faces are in this way secured.

The porcelains should not press upon the gums except in the anterior portion of the mouth, where the formation of the alveolar process permits, and the perfection of speech demands it. The gold from the grinding surfaces should form a gradual slope until it reaches the porcelain, and should be entirely free from pits and other irregularities. When they occur, it becomes necessary to remedy these as well as other defects. This is to be done by the re-firing of either a single crown or an entire piece of bridge-work. At times gold, where needed, may be added by the use of the electric mallet, and a beautiful finish obtained with it. Under all circumstances, both porcelain and gold should present a perfect continuity of surface. With diligent attention given to the im-



portant details of construction which I have pointed out, the great bugbear of uncleanness, suggested as an objection to this method of substitution, is entirely removed. Of course, food and salivary deposits will accumulate around artificial crowns as well as about natural teeth, and the personal cleanliness of the wearer is the greatest and indeed sole safeguard against such injurious accretions with any denture. A philosophy that would condemn the insertion of bridge-work, artistically constructed on scientific principles, on the score of uncleanness, would as consistently advise the extraction of the natural organs for the reason that their possessor was a sloven. "Cleanliness is next to godliness," says Wesley, and

he who expects to wear a "crown," here or hereafter, must heed this maxim.

Fig. 51 shows an upper central and lateral incisor mounted upon a central root with spud attachment. Fig. 52 represents the four upper front teeth held in position by the two lateral roots. Fig. 53 the six upper front teeth mounted upon the two cuspid roots. Fig. 54 represents a full upper denture with the two cuspid roots and two molars as anchorages.

For the attachment of crown and bridge-work the best attainable oxyphosphate cement should be used. After a somewhat extended trial of quite a number, I have a decided preference for the preparation known as Dentoplastique, for the reason that it can be mixed quite thick, consequently giving strength and at the same time retaining its placticity so as to permit of thorough manipulation, before hardening. To give ample time for necessary work, many of the cements have to be mixed so thin as to greatly impair their strength. With the pin notched, and the root perfectly free from moisture, sufficient oxyphosphate should be placed around the pin and inside of the collar to completely fill all the space between the pin and the canal, the collar and the root. Firm, well-directed pressure should be exerted to carry the crown to its proper position, where it should be held for a few minutes to permit of the hardening of the cement, all excess of which oozing through at the edge of the collar should be carefully removed. Before being dismissed the patient should be instructed to be a little cautious in regard to subjecting the crown to any force for a short time.

For the accomplishment of the best results in crown and bridge-work it is necessary to give due *time* for proper attention to the minute details that are indispensable in skillful manipulation. *Festina lente*—make haste slowly—is as solid a maxim now as when first propounded. Dental operations are, with a frequency to be regretted, performed too hurriedly, and imperfections are the inevitable results. The excuse is a poor one to say that "people won't pay." In every community of any size there are always to be found a certain number of persons who are anxious to have the best dental work performed, and are willing to pay for it. It should be the aim of every reputable practitioner to acquire a practice among such a class. It takes time to acquire a reputation for skillful and conscientious work, but, once established, it is a capital yielding in the end rich dividends and deserved honors. I believe that the dentist who unremittingly bestows upon his patients his best efforts, and constantly aims to do the best work, will find that his chief difficulty will be to meet the demand for his services.



## DENTAL SANITATION.

BY ALTON HOWARD THOMPSON, D. D. S., TOPEKA, KANSAS.

(Read before the Central Dental Association of Northern New Jersey, at Newark, N. J., November 16, 1886.)

A LEADING branch of the great science of medicine to-day is that of sanitation or preventive medicine. In it the causes of disease are studied with a view of preventing it and its resulting loss of life in the human race. Means for the removal of the causes of disease, or at least for counteracting their effects, are sought for by investigation and experiment, which, by intelligent and scientific application, do much to avert sickness and suffering, and increase the length of human life. By this work much good has been done and much happiness conferred upon mankind.

In the near future it is likely that we will have a branch of medical specialists, professional hygienists, whose duties will consist in advising people in regard to the avoidable causes of disease, and the means of cultivating health. So much good has already been accomplished by popular education and practical hygiene, that every intelligent person nowadays is much more careful in regard to his health and the avoidance of disease than was a person of equal intelligence even so late as two or three generations ago. This popular knowledge and careful observation of the rules of health has increased the average of human life and is a positive indication of progress.

In the science of the prevention of disease, dentistry should not be behindhand in the scientific application of sanitary measures within its own special limits; the demands for systematic and thorough preventive science are so urgent, the opportunities for its application are so vast and the good to be accomplished inestimable, by the prevention of those diseases of the teeth which entail so much suffering and discomfort. This is especially apparent in regard to the great lesion of caries. The suffering it causes, the inconvenience it occasions by loss of the teeth; the fatigue, pain, and expense involved in its successful treatment,—all cry aloud for an effective means of prevention for this worst of dental disorders. Other diseases of the teeth and associate parts unite in the demand upon our investigating powers for the discovery of effectual means of prevention.

Beginning at the beginning,—we find that there are so many factors entering into the calculation in endeavoring to estimate the influences which induce predisposition to dental diseases, that we cannot enumerate even those which we know or suspect. But one of the first causes of caries, for instance, is a congenital or follicular

imperfection in the construction of the dental tissues, which renders the teeth more susceptible to the attacks of this disease. The profession are well agreed that, if the teeth were better organized primarily, they would be more resistive to the active causes of disease after eruption. It should therefore be our first duty to discover the sources of this imperfection, if possible, and to endeavor to correct them. Poor dental organization may arise from deficiency in either the quality or quantity of the constituent or constructive elements of the dental tissues, or imperfection of the tissues from which they are evolved. The primal origin of these sources of imperfection is, of course, weakness, anemia from whatever cause, and the treatment which naturally suggests itself is something which will induce a return to normal conditions,—to health and strength. That is the theory,—*i. e.*, given a condition of anemia or disease which causes defective formation of the dental tissues, the treatment indicated is a correction of the abnormal condition and a restoration to healthful activity of the formative function.

But in practice we find the application of this theory of treatment difficult, perhaps impossible. As we cannot diagnose every cause of functional weakness which induces dental imperfection, so we cannot treat that which we cannot understand. But with what imperfect knowledge we have, we can accomplish something by the intelligent and scientific application of that knowledge, and further, by the old methods of reaching beyond positive science into the realms of empiricism, for we cannot wait for a lagging science to light us forward in this field of progress.

As the sources of imperfection of the dental tissues often lie in general weakness of all the tissues, and consequently of all the formative organs, we can comprehend and really treat somewhat intelligently and positively, and it is a field in which we could accomplish much good. If general anemia, transmitted anemia, were corrected, most if not all hereditary weakness and imperfection of tissues could be avoided, and strong organizations would be the rule and not the exception. For a strong constitution and perfect tissual organization—*i. e.*, perfect normality in all parts of the system—would necessarily yield good and strong teeth. Strong, normal dental tissues being the first desideratum in the positive prevention of dental diseases, and strong teeth accompanying normal and strong general organizations, it follows that our first step is to produce strong constitutions. This would involve pre-natal advice and treatment, to which the prejudice of the times has not yet given way; but this will come in due season, and then we can lay the foundations for the teeth of the future.

Of course, the first necessity is a vigorous maternal system for

the production of a strong, healthy child. But we cannot as yet go into scientific human breeding and have people created according to the laws of selection. Being obliged to take them as we find them, we must treat them accordingly without the privilege of making them over. So we will need, as a first step, to study the maternal organization, and advise such special treatment and care as may appear to be required in addition to general hygienic directions—such as good, wholesome, abundant food; careful exercise, proper rest, etc. This will conduce to vigorous health in the mother, and the child—other things being favorable—will more likely be strong and have good teeth.

Right here we might say that, regarding the influence of pregnancy upon the teeth of the mother, it is not so much, perhaps, that the teeth or bones or other tissues are robbed or deprived of any particular elements to be used in the construction of the forming fetus, as that her own assimilative functions are, for the time, held in abeyance, and that all the nutritive and assimilative force is directed to the evolution of the new being. While the maternal function has for a time the effect of accelerating all the physiological activities of the maternal organism, this activity is neither durable nor sthenic, but soon gives place to tissue-starvation. This is because all the nutritive elements of the pabulum, a proportion of which should go to repair the results of normal waste in the maternal tissues, are directed to and appropriated by the fetus, thereby actually starving the former for the benefit of the latter. The ordinary waste goes on in an unimpeded, physiological manner, but there is no compensating reconstruction as in health—a molecular retrogression, but no equalizing progression. Her teeth become weakened by the continuance of waste within their tissues, there being no compensating re-molecularization, and they become thereby the ready prey of caries. Here the question of treatment arises—can we correct this waste, induce assimilation in the maternal tissues, and at the same time aid the fetus in attaining a strong physique and a strong denture by special treatment?

The whole question of phosphate feeding is about to be reopened by the investigations of the indefatigable Dr. W. D. Miller, of Berlin. His prospective experiments on exact phosphate feeding, with alternate starving, of animals, with a view of testing its effects upon the tissues of the teeth, will be fraught with incalculable interest and value to the profession, which will await his results with impatience. In the meantime it has been pretty generally agreed by our thoughtful men that the old-fashioned notion of special feeding has little in it to commend it to our confidence. We are more prone to



believe that the pre-natal treatment for the production of good teeth will be that which will conduce to the best health and the development of a strong physique, and following that—other things being favorable—good teeth cannot but result, with other strong tissues.

Hereditary diseases or predisposition to disease, or organic or tissual malformations, will require the special treatment which such conditions will indicate for their cure or modification; but the discussion of the pathology of dental embryology is not within the province of this paper.

During the first years of infancy the greatest care must be exercised and the greatest anxiety felt for the healthful development of the system, as it is during this period that the permanent teeth are mostly produced. As all the after health and perfection of the teeth depend upon complete organic and inorganic molecularization during their follicular evolution, it is of paramount importance that this development should be healthful and vigorous. Any diseased or disordered condition of the system—and the baby is very much disposed to disorders during these years—will leave its indelible effects upon the developing teeth. Indeed, so marked and constant is this, that in practice, when we examine a child's teeth and the incisors or first molars are pitted or shrunken, we almost involuntarily ask what severe illness the child had during its first years. If there is any marked lesion of the enamel, we almost invariably find that there was a severe illness, which may have been one of the exanthemata; or again, a serious intestinal or nervous derangement, caused, they will say, by "teething," but which *we* know to be due, more than likely, to improper feeding during teething. Or we will often find that the defectiveness is accompanied by a history of artificial feeding during infancy, with its attendant illnesses, notably on "condensed milk." Right here we can make a positive rule, even with our present imperfect knowledge, that for perfect teeth the first desideratum is natural and wholesome food, which, by its good effects in producing natural, vigorous development of all parts of the system, will also produce good teeth. Artificial feeding, or an irregular or pernicious diet, by deranging digestion and preventing assimilation, starves the entire system—if nothing worse—and causes weak, imperfect organization of all the tissues by depriving them of the materials for construction and also of the strength to build. Especially do the teeth, which are so peculiarly susceptible to nutritive insufficiency, suffer from this deprivation, and often carry marks through life which mean nothing but a history of starved development.

Phosphate feeding during infancy is also a mooted question. A

wholesome diet should contain abundance of lime-phosphate, not only for the dental but for all the developing tissues, for there are few which do not contain the phosphates in some form. Such foods are simple and are furnished to hand by nature. These and these only should be abundantly employed, up to the complete requirements of the system. Wholesome food with fresh air, sunlight, exercise, rest, and complete emotional and mental quiet, must tend to produce a healthful frame and strong teeth. With progressing age the food must be advanced from the maternal fount in infancy to other foods carefully adapted to the changing requirements of the digestion.

The treatment of the dental tissues after eruption, as regards molecular changes within their substance, will receive much illumination from the researches of Dr. Miller. In the meantime we can only assume that the phosphate or other waste which causes those sudden deteriorations in the teeth which are so often met with in practice, must be the result of phosphate or other starvation. There is evident cessation of constructive nutrition, while waste, either normal or abnormal, goes on with unchecked, startling rapidity. We often find in young persons during adolescence that there suddenly appears a condition of molecular retrogression, or progressive softening of the dental tissues, which we sometimes find to be accompanied by irregular habits of diet, usually an avoidance of wholesome foods and an abnormal appetite for pernicious and innutritious viands. In this diet we may or may not find the cause of phosphate starvation. At any rate we advise on that basis, although the coincidence may not be a hint from nature. Experiments of special feeding, as with preparations of phosphate of lime, have been repeatedly made, but the results have not been what we desired. We now think that we can hope for more from wholesome food and health-giving habits, which will tend to develop and strengthen the entire physique, and with it, of course, produce good teeth.

Phosphate starvation may result from a variety of causes. One of the most fruitful is that great physiological error of all civilized people in our day, and a principal source of the weakness, anemia, and depressed nutrition which are the chief factors in the production of deficiently constituted teeth,—*i. e.*, *mal-nutrition*. We eat enough, perhaps we digest enough, to supply all purposes in the normal economy of the system, but we assuredly do not assimilate enough for the construction or reconstruction of tissues. We fail in this primary construction during development, and we fail in after reconstruction in the replacement of physiological waste. This is because we fail of a proper tissue assimilation and appropriation of

the elements of the nutritive pabulum which the digestive processes elaborate and throw into the circulation. The nutrition is there; the food is at the mouth of the hungry tissue, but it does not possess either the will or the power to grasp it and make it its own by working it into its structure. The molecules of the tissues lack that polarity which recognizes and attracts the atoms necessary to the re-molecularization of growth after waste. There is an electrical deficiency,—a want of electrical tone, perhaps; so the food passes on to clog the blood and decompose therein, and in turn, perhaps, to cause those diseases of the eliminative organs which are so common. The discovery of the origin of this mal-nutrition and the application of a cure is, of course, the great desideratum; but of these we can tell but little. As all nutrition, whether for the production or the reproduction of tissue, depends upon the stimulus of use for its activity, perhaps we can assume that this mal-nutrition is the direct result of disuse. This disuse transmitting a deficient stimulus to reproduction, a tissual atrophy results, which we so constantly observe. Then, after development, disuse deprives the tissue of that stimulus due to employment, which is the source of its healthful demand for nutrition. If this be true, then the correct treatment is judicious exercise and use. If tissue-hunger is the demand, and follows upon use, then exercise must be called in to create it. So the mother before the birth of the child, and the child after birth, must have careful, vigorous exercise. This is true of the teeth, also, that disuse will lead to atrophy of their tissues and surroundings, and that they, too, require transmitted stimulus as well as active. In a word, indolence, disuse, means atrophy, death; while activity, exercise, employment, means growth, health, life.

As to the external local treatment to be employed for the prevention of diseases of the teeth, there is not much to be said. The two great means of prevention are *active use* and *cleanliness*.

Use as a prophylactic measure includes all that nature intended that the teeth should be used for, and the careful avoidance of all that she did *not* intend them to be used for,—*i. e.*, abuses of all kinds. Mastication is of value in preserving the stimulus on which molecular activity depends in the dental tissues and in the dental environments, as well as for the sake of the function itself in the physiology of the economy. Therefore, food should be thoroughly and deliberately masticated, that all the ends of thorough mastication shall be fulfilled, and that neither the teeth of the present nor those of the future shall suffer from present or transmitted atrophy. All mechanical, chemical, or other abuse must be carefully avoided. To this end patients must be educated in all preventive care of the teeth. As to cleanliness, this is now so simplified that, by the



light of the advanced science of the day, cleanliness is now akin, not to godliness, but sterility; for where sterility is there purity abides. This means that all sources of fermentation, all bacteria culture, so to speak, must be banished from the mouth. For the purposes of removing fermentable substances, we usually advise, first, the mechanical means of brush and dentifrice; then antiseptics for preventing fermentation; and next, for neutralizing and counteracting the results of fermentation, antacids. As to the mechanical means, it matters little how the teeth are brushed, or what kind of a brush is employed, provided the cleansing is thoroughly done and the brushing not overdone. All particles of food and other sources of fermentation must be removed from every part of the teeth and gums and mucous membrane. For not only the teeth and gums, but the tongue and fauces, should be well cleansed to remove all the sources or products of decomposition. Especially is this desirable when any derangement of the stomach or lungs, or disorder of the membrane of the mouth, nose, or throat exists. As catarrhal affections of the nasal cavities are so frequent and so contagious to the other neighboring cavities, thorough cleansing should be employed as a prophylactic, that they may not obtain a foothold in the mouth. This brushing must not be violent, but of that skillful kind which cleanses without irritation. The dentifrice should be cleansing, polishing, and antacid, as most of those supplied to us are; but there should also be careful avoidance of those proprietary dentifrices with secret formulas, which, by being too rapidly cleansing, are also chemically injurious. Antiseptics should be employed for the prevention of fermentation in the interstices of the teeth and in the folds of the mucous membrane. The phénol sodique preparations or mercuric bichloride are the best and most effective. The antacids and antiseptics are preventive local prophylactics, and should be employed in accordance with the requirements of each case.

The external treatment of the teeth for the purpose of hardening the enamel is a field which has been but little explored, but we need a means of accomplishing this. We know that the zinc phosphate cement possesses this power, and we employ it in exceedingly soft teeth with decided results as to increasing the density of the dental tissues about the carious cavities. This is scarcely practicable over the entire tooth, but we require some means of producing a similar result by external application. In cases of very soft enamel, with chronic acidity of the saliva, we often prescribe the chalk-pack or lime-water wash, with some apparent benefit, but only so far as the antacid prevents acidity and stops corrosion. We yet require a remedy which will augment the density of the enamel by

external application, and, from a physiological stand-point, it is not asking too much of the science of the day to furnish this.

But the field of dental sanitation is too broad and too varied in all its branches to presume to cover it in one essay. It is, besides, so new that what little knowledge we do possess is not so classified that we may utilize it. In short, it is very far from being the science that medical sanitation is. But what we do know we should know well, for positive knowledge is the beginning of progress.

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## ANCHORS FOR FILLINGS IN TEETH.

BY W. STORER HOW, D.D.S., PHILADELPHIA, PA.

THE proper preparation of cavities in those natural living teeth which are to receive permanent fillings of gold or other material requires, not infrequently, the provision of means for anchoring the fillings independently of, or in the absence of some portion of, the walls of the cavities, and it is with reference to such means that the following considerations are presented.

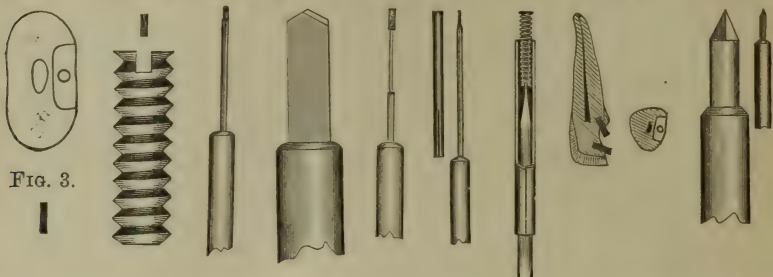
The employment of what are commonly called retaining-screws has been deemed an excellent mode of procedure, and many of these devices have been brought forward and found to be more or less useful in certain classes of cases; serving, moreover, to establish beyond question the fact that a properly-placed and suitably-shaped screw forms an anchor which will retain a filling in useful contact with a tooth under trying tests that would result in the loss or displacement of a similar filling not thus secured.

Without entering upon a discussion of the screw systems hitherto employed by dentists, and with a view to the avoidance of complication or confusion in relation to those systems, since they may continue to be employed, the devices here described and illustrated will be characterized as anchor-screws and anchor-screw appliances.

A living inferior central, of less than medium dimensions, has been made the basis of measurements to determine the proper diameter of an anchor-screw, which, with threads of suitable shape, pitch, and depth, would take a firm hold in the dentine, and yet occupy no more tooth-space than would be compatible with the continued life of the tooth. The cervical mesio-distal diameter of such a tooth is .150 of an inch, and the like diameter of the pulp-canal .025, which gives a wall thickness of .0625. The diameter of the screw may therefore not exceed about .030, as is evident from Fig. 1, which represents the relative diameters magnified three times. The shape of the screw-thread is that of a rounded V, its depth .005, its pitch one hundred to the inch, and the diameter of the screw .030. The proper immersion of a screw is about once and a half its diameter,

and its projection from the dentine need not ordinarily exceed the depth of its immersion. The length of the anchor-screw is therefore .100, and its exact size is that in Fig. 2; the same magnified ten diameters being shown by the lower cut, which exhibits the shape of the threads. For occasional use a somewhat longer anchor-screw will be desired, and this is shown exact length (.150) by Fig. 3. An anchor-drill, with a limit to gauge the depth of the screw immersion in the dentine, is shown, exact size, in Fig. 4, and magnified in Fig. 5. The anchor-tap, exact size, is seen in Fig. 6, and the character of its threads is shown by Fig. 2. The size, shape, fine quality, keen edges, precision, and delicacy of this instrument are suited to the nature of the subject, the friability of the material, the relative situation of the teeth, the risk of impairing their vitality, and to the sensitiveness of manipulative touch acquired only by the skilled dentist. No others need apply it with the expectation that such a fine-tempered tool will resist the destructive efforts of careless or

FIG. 1. FIG. 2. FIG. 4. FIG. 5. FIG. 6. FIG. 7. FIG. 8. FIG. 9. FIG. 10.



bungling hands. The anchor screw-driver and its sleeve, exact size, are shown in Fig. 7. In operation the anchor-screw is placed in the sleeve so that the screw-end will slightly project from the sleeve, which frictionally slides on the shank of the anchor screw-driver, as will readily be understood by reference to the enlarged and sectional view, Fig. 8. By this means the anchor-screw may be entered and driven nearly home, and then turned hard down with a stronger screw-driver, which will also serve to spread the wings of the screw-slot, if that shall be deemed desirable, though it is usually unnecessary for security of anchorage in the filling.

In drilling for an anchor-screw at the cervical part of a cavity, the direction of the drill should be as nearly parallel with the surface of the tooth as practicable, in order to avoid dangerous approach to the pulp-canal; a misfortune that the drill limit is designed to preclude. Fig. 9 exemplifies the correctness of this view by the section of a superior right lateral which had been deprived of the mesial third of its crown, and its relation to the central was such



that anchor-screws could be safely imbedded in the dentine as shown. The cross section serves to show the holding value of the anchor-screw in the filling at the tooth-neck. The importance of having the anchor-screw placed midway between the pericementum and the pulp, and the fact that the drill-end is not a sharp point, render it advisable that a center-drill should first be used, and such a drill is shown, exact size, and also magnified to exhibit the drill-point, in Fig. 10. By its use a starting-pit can be made with exactness at a median point in any accessible part of the cavity, the cutting angles of the drill being such that a combined forward and lateral pressure in operating this drill will cut the pit to one side or the other, if the pit should have been begun a little away from the proper place. The center-drill, anchor-drill, and anchor-tap may be advantageously employed in forming retaining-pits with screw threads which will retain the gold foil built in them. In every case it is of great importance that the cavity be made dry before using the drill and tap, and that the warm-air syringe follow both the drill and the tap to drive out every loose particle of dentine that might stop the tap or screw before the bottom of the hole is reached, or might subsequently absorb destructive moisture.

The anchor-screws are made of 20-carat gold, so alloyed as to combine strength with softness and purity to a degree that will admit of the welding of gold foil to their surfaces, which should in every instance be made clean and freed from gas films by holding each screw for a moment in the annealing flame just prior to the fixing of the anchor in the tooth. Anchor-screws of precisely the same size will also be made of iridio-platinum, a special alloy of iridium and platinum that will not be acted upon by amalgam or any material which can be used for filling teeth.

In some instances it will be of advantage to slide flattened pellets or short sections of folded foil under the anchor-screw at the beginning and during the continuance of the packing of the cavity with gold; and in case the anchor-screw lies quite near the floor of the cavity, and especially if that floor immediately under the screw is presumably thin over the pulp cavity, then pieces of heavy foil, cut to the width of the cavity and slipped edgewise under the screw, will form a secure foundation on which to build the filling.

It would be easy to multiply illustrations of the many kinds of cavities for which these anchor-screws are adapted, but at present this is deemed unnecessary, as the case given, Fig. 9, embodies the principles operative in any given case; and it is believed that few cases are to be found in practice that would not receive a stronger assurance of permanence through the judicious employment of anchor-screws in the teeth and fillings.

## PROCEEDINGS OF DENTAL SOCIETIES.

## NEW YORK ODONTOLOGICAL SOCIETY.

THE New York Odontological Society held its regular meeting, Tuesday evening, November 9, 1886, in the parlors of the New York Academy of Medicine, No. 12 West Thirty-first street.

The vice-president, Dr. J. Morgan Howe, in the chair.

On motion of Dr. Northrop, Incidents of Office Practice were passed, and the essayist of the evening, Dr. Bonwill, of Philadelphia, was introduced.

Dr. Bonwill. I have to apologize to you for the length of the paper which I have necessarily had to prepare for this occasion. I have tired you so often by lengthy papers that I know you have talked about me after I have gone—in kindness, but still I cannot help but feel it. It was impossible, however, to treat this subject properly in a few words.

The following paper was then read by W. G. A. Bonwill, D.D.S., of Philadelphia:

HERBST ROTATION METHOD VS. THE AMERICAN SYSTEMS OF FILLING  
TEETH WITH GOLD.

Mr. President: By the "imposition of hands" upon me by your executive committee to so sacred and important a duty as judge upon the new system of filling teeth with gold by the "rotation method" of Dr. Wilhelm Herbst, of Germany, and as advocate for the American systems, I enter upon the holy mission with some misgivings. I am unable to divine whether or not you have called me to this work believing I have been truly converted to the new dispensation, and am ready to go forth preaching and practicing its doctrines, abandoning practices that to some seem antiquated. I presume, however, you have invited me believing that I *should* have something to say, inasmuch as the new doctrine is so antipodal to that promulgated by me when I first introduced automatic power for filling teeth with gold. It may be I have been a false prophet, and am not fitted to reveal the truth from either stand-point. But, as works and not faith is what you want, I shall hope to place before you demonstrations of the results of the past—nearly twenty years—in the use of machinery to dental purposes. Before I do so, permit me to offer some arguments and explanations which will prepare you the better to receive the "Koran" which I am still willing to uphold and worship.

First, you wish to know what I think of Dr. Herbst's "rotation

method." "Have you seen him operate, and have you made an effort to practice it in the mouth or out of it?" If any one gave him closer attention, went oftener to see his clinics, and was more regardful of the delicate position he held while here, I would like to see him. No one could have had more interest as to the results, for no other system had seemed so counter to my own; and if rotation was as applicable as its advocates claimed, my experiments and life's work would have to go down in the general wreck. I never doubted from the first that gold was capable of being packed by such a motion solidly and afterwards rolled into plate.

The study of force, as applied by the various means, but leads to the same ends,—comparative perfection of solidification. There is but one force, and its results are in ratio with the instrument through which it is applied, the material used, and the spirit back of all that directs the power. It is unnecessary to go into the depths of physics to understand our subject. Those of us who have gone through every phase of filling, from hand-pressure to the mallet, with soft and hard foil, can see whether there has resulted some good, and where have been the failures; whether it was to the material used, the force, the character of the tooth-substance, or the relations existing throughout. Have all our efforts been in vain, and are we to fly at this juncture to other methods "we know not of," and indorse the *last departure*, as some have so vociferously done, without a qualification? Is there no law worth observing and practice to be followed of the past dispensation? How many of us can say that we have exhausted the forces once used, and that we need a new force or another mode of application? Who are to be the judges of this? I feel that a very grave responsibility rests on me in coming before not only you but the world to speak what I have practiced, and at the same time do justice to other men.

Now, after all this banqueting and gayety is over, we must settle down to the naked truth, and ask ourselves if we have done our duty to the past record. Before I pass to the merits of the issue, I must be permitted to say that, while I shall uphold my own country and my own system, I shall endeavor to treat our departed brother with all fairness and respect. As I said in his presence, I was glad to meet any man who had the courage to come to America to teach us how to fill teeth by a different method; one who had persistently battled for a conception in his own land amid persecutions such as have fallen to others as well, and a man who is evidently a mechanician, and like whom we find so few in our own ranks. While he brought us no great inventions or works, his fingers had brought out in his environment what any one of mechanical instinct would have done and has before in our own and other



countries; a man who was modest amid such honors as we had not shown to others; and who at the last, when he had been permitted to behold the works of men in America, was fair enough to say that, could he "have seen such operations and instruments before he commenced his 'rotation method,' he would not have been here to-day to show his life's efforts." I am glad, then, that I could have the opportunity to say God-speed to him and his method, for, if it could live at all in the future, it should after the push given it while here. I must congratulate his bosom friend, Dr. Bödecker, for his untiring services in time and money in supporting Dr. Herbst in every way and in heralding his coming. The love he bears his own country and fellows must, of course, be stronger than for his adopted country, to which he owes so much, if not all, of his prestige. It is but natural that he should desire to see the *best method* of filling teeth, as well as the best gold for this purpose, come from Germany.

Dr. Herbst, in his seclusion, must certainly have heard of American dentists and their methods, as well as the implements they had created. Dental literature is not confined to our own country. Dental depots and agents are everywhere, and he surely could have known the state of our art when he began "rotation." It is always safer, in prosecuting an invention or anything new, to know what has been done. He felt the need of doing better work. He knew how to turn up a disk of soft iron or brass with a burnisher in a lathe. He knew the fibers of the metal were driven into new relations to beget form, and he was familiar enough with tools to make the application to the dental engine to place gold into cavities of teeth. He thought he must have a new gold also. Through years of labor he at last learned, as he thought, how to fill teeth to perfection, or he was at least approaching it, and he supposed himself far ahead of the world up to his advent here. Except the gold and burnishers, he had everything at hand. He had no inventions to make to enable him to use his tools; no years of labor in creating new devices. The dental engine, rubber dam and clamps, hard and soft gold, such as we were using; hard and soft rubber corundum disks, sand-paper strips and wheels,—in fact, everything which we now use, and to be had at his own home by the asking,—all these he brought with him, as though they were new. He gave seven years of adaptation to this one method to perfect it before he could feel satisfied it was ready to be presented.

What is claimed for this new application of force? First, the most perfect adaptation to the walls of frail cavities; second, that it can be done with greater speed and less labor to the operator; third, that it is more comprehensible and easier of adapting under all the varying circumstances that confront the modern dentist; fourth,

that it offers a greater reward to otherwise poor operators under other systems, and insures to the patient better results because of this, and compels the use of the purest gold; fifth, that it is by far the most pleasant to the patient; sixth, that it was the only method by which soft foil could be packed and made adhesive, with but one make of foil adapted to its use.

We will follow Dr. Herbst from the start. Has he prepared his cavities to avert the subsequent action of the first cause of caries? Has he not shaped them to allow him to fix the matrix, without which he could not operate successfully? Must he not have also such concave cavities, even if the walls are thin, that the rotator or burnisher can reach all points? When cavities have overhanging walls or deep and sharp undercuts, or where the burnisher could not reach direct, how much hand-work does he expend? How much of real rotation does he perform in the operation? Can he perform (or did he) upon one case solely by rotation? After using this *sine qua non*, did he not test every part of the surface of the gold with a sharp-pointed instrument in the hand, to be sure that there were no soft places? Which did he consider the surer of the two? One would have supposed the rotation would be last! Did he not stick each piece of gold by hand-pressure before using the tool? Did he not fill in around the angular walls on the periphery by hand-pressure? In fact, were not all his operations by the hand-pressure method, using the rotation as a further condenser, like those who use the Snow & Lewis mallets after hand-pressure? Was any one impressed with a sense of security when a fine-pointed plugger had to be used over every part of the surface?

Knowing what we do of the subsequent cause of failure, would we shape our cavities as did Dr. Herbst, leaving large portions of tooth-structure to come in contact on approximal walls? This had to be done to carry out rotation in the easiest manner and insure retention, so far as the action of the burnisher is concerned. Would we sacrifice on labial and buccal walls of the incisors so much structure in order to reach with such blunt-pointed instruments? We who have been accustomed to so much open space could but feel that shutting out the light and sight by the matrix would not insure closer adaptation. Who would like to run the risk of the burnisher coming in direct contact with the edges of frail enamel, which was frequently done by him, and was unavoidable, when rubbing gold over a sharp ledge? Who would not rather have a surplus edging of gold at the margins than merely enough to make a flat and square joint with the enamel? Frequently large securing pins have to be placed in cavities. How much room would there be for rotation?

These points occurred to me as strong objections to the system.

To insure us against failures which would be likely to come from a method beset with so many objections, we should see the actual tests in the teeth of his patients. It is not enough to take one's word for it; we want to know by sight and time's test. Clinical operations are no tests of one's ability to perform perfectly. In this particular we should not judge Dr. Herbst harshly. I know how many failures I have met with under similar circumstances. With hard foil no operator who can use a mallet wants a matrix in one case in a hundred. He wants all the elbow-room he can get, which at best is but limited. Then, while we can get perfect solidity of the gold, I do not believe I could have perfect adaptability to the walls after the manner in which I prepare my cavities. Out of the mouth it may be done by rotation; but in the oral cavity, unless I changed my whole mode of preparing the approximal walls to circumvent future active causes of caries, I am sure it would be no advance to me to adopt this method.

Practically, then, I must object to the first claim of better adaptation.

The best time that Dr. Herbst made, according to the report of Dr. Bödecker, published in the *Dental Practitioner*, in a matrix out of the mouth, was one grain each minute. This is fast as compared with the average operator. It will be remembered that at Asbury Park I gave a clinic *in the mouth*, on two separate cavities, when I used one hundred grains of gold. One cavity took twenty-eight and the other thirty-two minutes, being over a grain and a half to the minute; and many critics assured me it was not slighted in any respect. There was no stuffing nor using of heavier foil than No. 20 adhesive. Several times, when out near the walls, I used this number doubled, occasionally tripled, to show the force of blow. I took Abbey's soft foil, No. 30, and, after heating as I would the adhesive, packed it on to the adhesive No. 20 with as much facility and as perfectly as I did the latter. This I could not make others believe by talking, but they did not doubt their senses after seeing it. Abbey's soft foil is unique, and no amount of annealing will make it adhesive. However, the blow of the electric or mechanical mallet will pack it so thoroughly that it can be rolled into plate. I used only this foil for three years after completing my electric mallet, and frequently use it now, though I prefer adhesive No. 20, which adapts itself practically to nearly every want; but being harder than the soft, it bears more attrition.

One of the fillings which I shall show you to-night in another form I did in just thirty minutes, using sixty grains of gold foil,—two grains to the minute. Therefore, if time is an element in operating, my method is as two to one against rotation.



Can the average dentist grasp this method and practice it with greater facility and more perfect results than the mallet system? We have a much larger percentage of good operators now than before machinery was first used, and the failures grow less as men become familiar with power and the best manner of using it. Why should it have been so long before the engine and the electric and mechanical mallets should receive their proper recognition? Was it the fault of men or the instruments? Now that they are in the hands of the best men, why is it none step forward in the arena to uphold them? If it has taken so long to understand or become accustomed to malleting by power, shall it be laid aside for other experiments that offer nothing in all the claims to justify more than a passing trial? If, with every adjunct previously invented at hand, the "rotation method" required seven years to merely perfect the manipulation of a certain kind of gold, the results, as we have seen them, not being what we had hoped over and above our own; and if, after several years of tuition and practice, Dr. Bödecker himself cannot wholly use the method without the electric, mechanical, or some other mallet to give the finishing touches to his fillings, I feel secure in my old boat that has carried me so long and so safely. I am reminded just here of one of Mr. Lincoln's quaint proverbs: "It is not safe to swap horses while crossing a stream."

How few to-day understand the full usefulness of the dental engine!—far less the philosophy of the electric and mechanical mallets! If I could have had the chance to explain their workings fifteen years ago as fully as to-night, their usefulness would have been ten fold. For the first time in their history have I been asked to read an article that would draw forth the philosophy of their mechanism and workings; and I shall in a few words reveal to you what has never before been in essay or print.

The introduction of automatic power to dental instruments for filling with gold dates back to February 27, 1867, in the invention of the electro-magnetic mallet. This was destined to open a new era in dentistry. It has led the world into grander work; and, in lightening labor and saving time, has added hours for reading, thought, and reflection. Man is no longer a machine, but simply the custodian of it. By the birth of the electro-magnetic mallet it was at once possible to use a different movement on the face of the filling. In the use of the Snow & Lewis pluggers one blow only can be given at a move of the hand, and it is impossible while that is being done to slide the face of that tool, be it ever so smooth, over the surface of the gold. The gold was consequently at right angles with the line of force, and would be kept mostly at a dead level. The fixed face of the filling was flat or convex,—never concave. And, as

the blow from such automatics was only direct, admitting of no sliding movement, the walls always suffered even with soft foil.

Let us now unravel the blow from the electric and mechanical mallets. The blow from these truly automatic pluggers is given without pushing upon the filling. The tool is free to be moved over the surface while the blows are being given from three thousand to six thousand a minute. You can burnish or rub over the surface of the filling, forcing the gold sidewise closely against any walls or under sharp cuts. Besides, it permits you to keep the surface of gold concave to a very great extent, filling in the interior later. The gold is carried up on the frailest walls, each piece reinforcing itself and laying a floor up to the margins. This plan gives one a security that heavy blows from the mallet cannot efface. It enables one to so weave the foil by degrees over the edge or periphery of the cavity that there is always a fold of gold under the condensing-tool. This lateral pressure, while the blow is being given direct, acts precisely like a burnisher in the hand. This is the same as is done by the rotation method, but with the additional advantage of applying instruments so small that any spot can be reached, and without all the paraphernalia of matrix, loss of time, or the necessity for hand-pressure. The lamented Webb with most of his followers learned at last the value of this teaching, which they were so long in grasping. The secret of rapid filling lies in this one thing. While most men would be making an impact over one spot, I would range in the same time across the whole surface of the filling and pack it thoroughly.

Another fact in connection with this sliding rotary movement is that it is unnecessary to go over that surface the second time, the foil being of the proper size and shape to admit of easy handling. It is just impossible to stuff a cavity. This gives many minutes in the hour.

What shall be the shape of the face of a plugger? Go to the gold-beater and scan his heavy hammer! Its face is oval with rounded edges, that, should it not fall directly true upon its face, it will not cut the vellum nor injure the foil therein. It would be quite impossible to make an even foil unless this one thing were well designed. And yet it must not be so round as to indent because of a too prominent center. Pluggers, therefore, should be slightly oval, with rounded edges that will not cut the foil against the edge or walls of the tooth. The hardest thing I had to learn was just how much foil to keep under the tool. From No. 5 folded to No. 80, and up to 240 occasionally, I at last settled upon No. 20 without folding. It is more adaptable with less force, and a lighter and more rapid blow is much easier for the patient, and speed compensates for

the difference in thickness of foil. I have made just as fast time with No. 20 as with heavier foils, and have had the further satisfaction of knowing that every part had been reached, and the gold homogeneously laid, with no hollows. The rotation method would necessitate my going over the surface with a small plugger-point after each layer. Not the least consideration is the fact that I have learned to begin and to end nearly every cavity without the aid of hand-pressure, thereby fulfilling the highest mission of all machinery, and of these instruments in particular. The hand-mallet is the only and nearest approach to the instruments in question.

You must see, then, why I do not argue against "rotation." It will do what is said of it where the cavity will permit of access and the necessary adjuncts. But we have something far superior already. I can surely say that, were I compelled to give up my present appliances and resort to the "rotation method," it would be like going from a palace-car at a mile a minute, with every comfort to myself and guests, to the antiquated stage-coach.

As a refuge, can poor operators by other methods be made more proficient by adopting this? At first sight rotation would seem more controllable, but no one who ever learned to be skillful with my instruments would go back—or forward, if you please—to anything yet offered as a substitute.

The only claim that seems at all convincing is that the purest gold must be used by rotation; but this is an assumption, for Dr. Herbst packed some No. 30 Abbey's soft foil on his filling, when he ran out of his own foil, with the same apparent ease and effectiveness; and I have since tried and found Wolrab's no better than, if as good as, Abbey's soft. I tried Wolrab foil under my mallet; and, while it works well, it would be *impossible* to produce better results than you will find in the demonstration I shall give at the close of my remarks.

The Herbst method may be easier to the patient, though I would not like to grant it in advance. While the freedom from concussion would be less irritating to the nerves, rotation makes a constant sound that must tend to annoy. Besides, the hand-pressure incident to perfecting the method is fully as objectionable as the mallet, since it consumes time and moves the head out of position. There is yet another element of weakness worthy of notice. There is an uncertainty about gold adhering or attaching itself if the burnisher becomes too smooth. This must be constantly watched, and emery-cloth used.

I must, then, reject the method in toto, so far as I am concerned, since I can see in it no advance or possibility of my being able to do any better than I am doing, except as practice tends to make



more perfect when kept in one line. And, as it takes quite a lifetime to learn to do well, it would be, to say the least, rather hazardous for me to change my methods or the foil I have so long used. Four dollars an ounce more have I paid the Abbeys for thirty-two years than any other manufacturer, and the uniformity of the foil has been wonderful. Their soft foil certainly has no parallel.

In the consideration of the Herbst method by its advocates too much stress is put upon the *packing* of gold alone. I feel that if any one thing is of more value than another it is the shaping and smoothing of the walls of the cavity. It is not all of saving a tooth to fill it.

To sum up my verdict, let me say, before any one condemns the oldest and latest American methods, let him try them without prejudice once more; and, if not too ignorant of mechanical principles, there is hope of his being reclaimed. We have so many in our ranks who are not of "the stuff" to make fine operators, and who will ever be upon the wing to be helped, that they cannot and will not rely upon any method, be it ever so successful.

So long as we *have to fill teeth with gold*, it is absolutely necessary that it should be made of the purest metal. If we can procure a foil in our own country that is good enough, it should be used, and not that of foreign make. There is no reason why we cannot make the best of foil. The Wolrab gold was extolled as a wonderful production, that involved Dr. Herbst and the manufacturer in great trouble to learn how to make it. For my own use, I feel that there is nothing superior to Abbey's foils. The soft foil should not be heated red directly over the flame. Place it on a thin sheet of platinum, and warm or dry it over a spirit-lamp. It will work like putty; rolling over each other, the layers go home without stopping and blocking the way. This is the very thing for frail walls No. 5 is heavy enough, folded to No. 20. The manufacturers have been accused of manufacturing the soft foil with some preparation upon the surface to keep it from sticking. Of this I can say that it is not true. Mr. Abbey took me into his sanctum, where no one but his own family had ever been, and showed me that both the adhesive and soft were treated in the furnace exactly alike. Up to the moment it goes into the furnace-muffle for annealing, after beating, Mr. Abbey himself cannot tell the difference in the sheets as they lay side by side. The heat at once makes one soft and the other hard. The secret of making it was an accident. Mr. Abbey does not know how to explain the *modus operandi*. The specimens I shall now display not only vindicate the character of the Abbeys, but they serve as the strongest possible proofs of the value of the electro-magnetic and mechanical mallets by which the work was all

done. Here are six pieces of plate and two large leaves of gold rolled by Charles Abbey, and again beaten into foil, for your close inspection.\*

In fifteen years I have lost a number of large gold fillings, placed in by both of my instruments. The cause of this was somewhat my own fault in trying to do too much. I failed to give proper shape to the cavities; and, not having enough anchorage, I could not have expected so small a neck should sustain so large a head. But I am happy to know I did fail. These products which I show you give me more satisfaction than all else. *They* will tell you whether the failure was from imperfect packing and whether the walls were safe by adaptation of the gold.

The speaker has had to bear for many years the reputation of stuffing his gold in order that he might be called the fastest operator! Look, gentlemen, at the results! The man who can again say it must do so without the least foundation. This should forever put to rest this shameful reproach, which I have borne in silence.

No difference can be detected in these specimens, whether done by the electro-magnetic or mechanical mallet. I can but say, after such a severe test from both the electric and mechanical mallets, that good results can be obtained by all other methods, and with other makes of foil; whether to the same extent I am not prepared to assert, but power applied in any way, if with equal force, as shown in the specimens, must result in like phenomena. That it can be done by the "rotation method" as thoroughly, I have no doubt; or at least gold can be packed as solidly rolled into plate and beaten into foil. *Therefore, it is not a question as to its power to do as would my mallets; but it is as to its practicability in all cases; or whether it is any advance over what I have done.*

I have labored for these twenty years, believing my own countrymen would one day see that my devices were worthy of adoption. The past year has assured me that what I have done begins to show fruit. I wish I could have done more. I can, in conclusion, only say that I have done my best, and I shall now retire for a season, at least, to watch the progress of affairs. Just fifteen years ago, when I first appeared on the scene and before this society, the reception was somewhat different from that of to-night. Frowns have passed into smiles. The future seems brighter. For all the opposition I have but thanks to offer. Without it no great results can come. The hour in our history has, I think, arrived when a true system of dental practice can be promulgated. *No one*

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\* One specimen was soft foil, not heated red—only warmed. The result is equal to the others.

*man can do it.* Setting aside jealousy and bickerings, let something be done to stay the tide that is carrying upon its bosom so much drift. Shame upon us that caries is not arrested! The barbarism in extraction should be banished, and everything done to hasten the hour when we can lay down all the paraphernalia which is accumulating so rapidly, and no longer have occasion to meet together to discuss these subjects. For one, I would be happy to know that we had so advanced that the edict should go forth, "Dentistry shall be no more!"

Dr. Bonwill showed some specimens, and said: I want you to understand that these specimens are not gotten up for the occasion. Some of these fillings have been in the mouth for ten years. One of them was a filling that I put in at a meeting of the Pennsylvania State Dental Society at Cresson, Pa., three years ago. In my hurry to allow my friend, Dr. Darby, to make a filling before the light had passed, I did not get my anchorages as thorough as I ought; the cavity was prepared rather hastily. I cannot do things well in clinics; I am too nervous a man for that, and have operated at clinics to the detriment of my own reputation. Up to two weeks ago I was afraid to attempt any such rolling of gold fillings as you see here to-night, but Mr. Abbey assured me it could be done.

The President. Gentlemen, it affords us all great pleasure to listen to Dr. Bonwill's views on this subject. Many will wish to take part in the discussion, and I hope you will be as brief as possible, in order to afford all an opportunity.

Dr. C. F. W. Bödecker. I wish to thank Dr. Bonwill for the very extensive and good paper that he has brought before us to-night, although in many respects, as you know, I do not agree with him. Dr. Bonwill has either not comprehended the Herbst method, or he has misrepresented it, for in many instances he has made incorrect statements. Every one who begins to use the Herbst method should apply it at first only for packing the gold against the walls of the cavity, the rest of the filling being done in the accustomed manner. In this way I do not see that the Herbst method is antipodal to the use of the mallet, hand-pressure, or any other method that has heretofore been used. All Dr. Herbst wants, and all he came over to this country for, was to show that it is a method by which you can make fillings as well at least if not better than you can make them by any other method. Dr. Bonwill claims that I go to all the trouble and annoyance of introducing this Herbst method just for the love of my country, Germany.

Dr. Bonwill. I beg pardon.



Dr. Bödecker. It certainly is there in your paper. Gentlemen, I have been an American for nearly twenty years, and I love this country above every other. Whatever I said and did for the rotation method was not for a single individual, not for pride of my native country, but for the dental profession in general. I think there is something in the rotation method that is worth adopting. Whether Dr. Bonwill will admit it, or whether he has some other object in view that keeps him from admitting it, or whether he does not quite understand the principles of that method,—that is immaterial. I know that it is worth while to adopt, at least, to a certain extent. Dr. Bonwill admits that the patients may like the Herbst method as well or better than the mallet. I have practiced this method for three years, in almost every cavity; at least, I have begun to fill every cavity with it. And when I take up the mallet—either the Bonwill, the mechanical, the electrical, or the hand-mallet—my patients invariably express their preference for the Herbst method. To-day I not only begin, but complete, every filling with that method; and I feel assured that they will stand just as well as though they were completed with the mallet.

Dr. Bonwill says that through the literature in Germany Dr. Herbst would have seen and known all about his instruments and operations. To a certain extent that may be true, although until within the last few years the German journals contained very little about the improvements which have been made in dentistry in this country. The journal that first stirred things up in this direction was the *Correspondenz-Blatt*, published by Ash & Sons, in Berlin. But Dr. Herbst is not a man who will sit down and read very much. He would rather go into his laboratory and see what he can do. And you must remember that he is in the woods; he is alone in Bremen, out of the reach of all societies, except once a year, when he goes to the meeting of the Central Verein, or that of the Frankfurt Society. Therefore, if, as Dr. Bonwill asserts, Dr. Herbst was not acquainted with the mallet system, it is not that he did not want to know about it, but because he had not had opportunities for seeing it. In this connection Dr. Bonwill quoted Dr. Herbst incorrectly. Dr. Herbst said: "If I had had the training that Dr. Bonwill or any one of you has had, then I would not have troubled myself to invent the new method; but I did not know how to use the mallet. When I commenced to practice dentistry for myself I bought all the American instruments. While in Bremen I met many patients from America and saw beautiful operations, and wondered how they were done. I had a mallet, but did not know how to use it. I threw it aside, disgusted with myself, and began to experiment to accomplish the same thing in another way." Not that Dr. Herbst was anxious to

invent something. If he had been able to get along without his inventions, he probably would have done so.

Dr. Bonwill seems to be very much opposed to hand-pressure. In my opinion there are many cavities which even to-day I think are far better filled by hand-pressure than with the mallet. In places where hand-pressure is used in the Herbst method I should use it any way if I filled with the mallet, because there are places which cannot be packed perfectly by a mallet, especially the buccal portions of cavities in bicuspid and molars. The principal object for using hand-pressure in connection with the Herbst method is to put the gold in its desired place before condensing it with the rotary burnisher. The preparation of the cavities, which Dr. Bonwill has objected to, is not in the least different from that for filling by any other method. Dr. E. Parmly Brown, while at my office, prepared the cavity of the right lower first molar in distal and grinding surface, which was filled by Dr. Herbst, and Dr. Brown's method of preparation suited Dr. Herbst exactly.

Dr. Bonwill objects to the use of a matrix for the reason that it takes time to make and apply it. The matrix, which usually is made of German silver, takes about one minute, or a minute and a quarter, to prepare and put on. By its use the patient is saved much pain, time, and annoyance in the finishing of the filling where the cavity extends far under the gum, or even up to the gum. If the matrix has been well fitted, there is very little trouble in finishing the filling. A sand-paper disk and a strip of emery-paper is usually all that is needed for that purpose. If I had the least doubt about the permanence of the fillings made by this method, I am sure I would say so. I am perfectly sincere when I say that I find that every cavity which I have so far filled by the Herbst method has stood every test.

Dr. Bonwill is quite correct as to the comparative time consumed in the operations made by him and by Dr. Herbst at Asbury Park, but he forgets that he had three assistants who cut the gold and handed it to him, his filling being therefore the work of three or four men, and not of a single individual. Dr. Herbst does not hurry very much; he looks around and talks, and does not think so much about the time. That is a secondary consideration, and not what we should particularly strive for. The main thing is the adaptation of the gold to the walls of the cavity; and I think there can be no doubt whatever that it is absolutely impossible to accomplish this as perfectly with any mallet as by the rotary method. When Dr. E. P. Brown filled a glass tube and a steel matrix, the plugs were not as perfect as the plugs which I made by the Herbst method, even with the imperfect instruments which I then used. I have tried it over

and over again, and while in the mallet fillings I find certain places that are imperfect, I do not find any imperfections whatever in the fillings made by the rotation method as Dr. Herbst now practices it.

Now for the question of gold. Dr. Bonwill says a great deal about my praising the German gold over everything else, from pure nationality. While in Germany, two years ago, I bought one hundred and twenty-five dollars' worth of gold, on which I paid fifty-five per cent. duty. I knew I had to pay the duty, yet I thought it worth while to buy it, which I certainly would not have done if I had not found an advantage in it for myself and for my patients. But the Walrab gold is not the only gold that can be used by the rotation method. Dr. Herbst does not claim that. He has been using many other kinds of gold, trying to make the American gold answer the purpose; for he understands very well that it would be a great hindrance to the general adoption of the rotation method if only German gold could be used. I think there is no absolute necessity for using German gold, except against the walls of the cavity, and even there you can use the American gold if you will be a little more careful. But in the center of the plug, and even on the grinding surface, I prefer the American foil. For the last four months I have not been using the mallet at all. I have tried it a few times, and then, taking up a garnet burnisher, found I could condense the gold a little better with the burnisher than I could with the mallet. I do not say that the manipulation of it is as easy to acquire. It took me three years to acquire sufficient skill in its use to give me confidence that I could pack gold with the burnisher as well as with the mallet. About three weeks ago, or a little longer, I contoured entirely by the Herbst method a lower central which was worn down in front to the edge of the gum, and had lost an eighth of an inch of the cutting edge. The rest of the teeth in the mouth I had filled about two years ago with the Bonwill mallet and heavy foil. I saw it yesterday, and it appears just as good as the other eighteen or twenty teeth that were filled with the mechanical mallet. Dr. Carr witnessed the operation, and saw the teeth before the operation. I am sure it is all right; and if it is not we will in time hear of it. Any one who has packed gold by the rotation method and an agate or garnet stone will have noticed that the surface of the plug is very much harder than you can possibly make it with any mallet,—so much so that an ordinary corundum-stone will sometimes refuse to take hold of it.

Dr. N. W. Kingsley. As the hour is late and we must soon adjourn, I want in the name of the society to thank Dr. Bonwill, not, in the words of Dr. Bödecker, for the length of his paper, but for the



ability shown in it, and particularly that we here have an apostle who is doing something to boom American dentistry. For my part, in this same connection, I want also to thank Dr. Bödecker for the great Herbst-German boom that we have had about us for the last four months and a half. Personally I thank him because it has given me several opportunities for a splendid free feed. And while I have enjoyed these feeds, as many others have, we have also been treated for four months and a half to nothing else in the world, it seems to me, but Herbst and Herbst methods; and after all, gentlemen, it seems to have come down to just about this,—that, in Dr. Bödecker's own words, it is only another way of doing the same thing that we have been doing. We were already doing it just as well; and according to Dr. Bonwill's claim, and according to the opinion of many of us, we were doing it a great deal better in our own way. In the beginning Dr. Bödecker claimed that this new method was superior to any other known or possible to conceive of; now it seems that it is only another form of dental gymnastics. I am reminded of going to a clinic at White's dental depot at one time and there seeing a man with a glass before him performing before the assembled multitude the operation of filling his own teeth! Consider for a moment, gentlemen, the spectacle of a man appearing before a so-called scientific body of men to fill his own teeth! Suppose he had succeeded,—what was to be learned or taught by it? Or what would it amount to if a man could stand on his head and fill his teeth? It simply shows what can be done by misdirected effort, not what needs or ought to be done. If this rotation method were going to be adopted by us, particularly these old, gray, bald-headed fellows, it would involve the upsetting of our former practice and methods, and would, before we could master it so as to arrive at any good results, lead to a great many failures and much disappointment. I am glad that all the reports that we have seen in the journals month after month of clinic after clinic, in all the minutiae of details, have come to this,—that we have learned that this is only another way of doing the same thing we have been doing, and that we are to be permitted to go on in our way if we choose. I want to move a vote of thanks to Dr. Bonwill in the name of the society for his very able paper.

Dr. Kingsley's motion was carried unanimously.

Dr. Bödecker. I have to make a few corrections in the statements of Dr. Kingsley. He has stated that I said the Herbst method brought only the same results as the other methods of filling. My claim is, on the contrary, that teeth cannot possibly be saved as well with the mallet process as with the rotation method; and that the adaptation of the gold to the walls of the cavity is

closer and better than is obtained by the mallet. For that reason I uphold the Herbst method as superior to the mallet system.

The President. Gentlemen, we have with us this evening a distinguished gentleman from the other side of the continent, Dr. Cole, of San Francisco, and I think that you will all be very much pleased if he will say a few words to us. He is not a dentist, but perhaps some inspiration may come to him after hearing this discussion of a subject that he is possibly a little interested in.

Dr. R. Beverly Cole. Whilst I feel constrained to recognize the compliment of being called to make some remarks, I scarcely know in what manner or direction they should be. Not being a dentist, I consequently feel little interest in this warfare except in the discovery that it distinguishes your profession as much, possibly, as my own. If there be under the canopy of heaven a community of men who always have their tomahawks raised against their neighbors, I believe it is the medical profession; and I am thankful for the opportunity vouchsafed to me this evening to have seen that it extends even to yours. I am pleased to have had this opportunity to hear this little war of words; and if you will permit me, I will go so far even as to analyze them to some extent. Here is a national pride exhibited. In this German I recognize, from my knowledge of his nation, amongst whom I have traveled largely, that earnest, honest, well-grounded, and conscientious pride arising from the knowledge he has that of all the nations of the earth, the Germans, perhaps, in the collateral sciences, are the most learned. I have said nothing about practice. That he should feel a pride in introducing Dr. Herbst and defending his practice, is the most natural thing possible, and only reflects credit upon him and upon his nationality. Upon the other hand we have Young America, with all his fuss and feathers, his great "whoop-up," and the spread of the great eagle's wings, the flapping of which resounds to the furthestmost quarters of the globe. That he should feel a pride in what America has done is but natural; and I, even, though not of your profession, as an American feel proud of what you have done. I know well, from my travels and observation, that the dental profession of America stands head and front above the world, and I challenge any man to successfully contradict or refute my statement. In our profession it is not so. As practitioners, yes. Place a medical man of a year's experience, educated in an American school of medicine, by the bedside, and I would prefer to assign the keeping of my health and the great question of life to such a man than to one of any other school in the world. In the collateral sciences, whether it be in pathology,

which is the foundation I may say of my science, or in chemistry, or in physiology, the Germans are much, very much, in advance of us. But whilst they are so, you will find, as you go through the wards of their hospitals, each student and his chief of clinic has in one hand a book and in the other a pencil, and they will stand and watch with the most scrutinizing eye every movement of the patient, and note the same; whether it be the muscles of the lip, or the cheek, or the arm, everything is carefully noted as they go from one bed to another, and they pass out of the ward without having thought to administer anything to save the patients' lives. That is science. They are obliged to sacrifice life to the great cause of science; and therein lies the difference between the European student and the American student. In medicine and in surgery, in gynecology and in dentistry, we are, as in every other direction, essentially practical. We take that which you (addressing Dr. Bödecker) give us, and make practical use of it, which you do not. We are grateful to you for what you have contributed to us, and we utilize it, whilst you are simply adding to the law in the same direction, of accumulating scientific knowledge, while ignoring totally its practice. I wish I were a dentist, so that I would be justified in discussing this subject.

I thank you, Mr. President, very gratefully for your politeness in asking me to say a few words, and I only regret that I cannot address myself to the subject of the evening.

The President. Gentlemen, I regret very much that the hour is so late that we cannot call upon Dr. Bonwill to say something on another subject. He has an improved tooth-brush which he would like to show you if time permitted.

Dr. Bonwill. The subject which your president has mentioned is secondary. I wanted first a full consideration of the subject upon which I came here to speak. I am sorry that there are not any more members to speak upon this very important subject that I have presented to you. It puts a damper upon me to a very great extent, and will influence me upon all future occasions, to find so few men ready to come out and say what they believe on one side or the other.

Dr. Benj. Lord. Mr. President, I think there are many gentlemen here who wish to speak upon the subject of the essay, and only for the lateness of the hour they would do so. It certainly is a very important subject, and it seems to be due to us as American dentists, and due also not only to our German brother but to dentists all over the world, that we in America should give some further expression of our views on the Herbst method; and I hope, sir, that the discussion



of the subject will be brought up at the next meeting of this society.

Dr. Dwinelle. Mr. President, I wish to indorse most emphatically what has been said by Dr. Lord. We are as intensely interested in this subject as Dr. Bonwill can be, but he must see that, however anxious we are to discuss the subject, the lack of time cuts us off. It is already half-past ten, and the evening has been mainly occupied in the reading of his very long paper, so that if we are at all to blame in the premises he must share that blame with us. As Dr. Lord suggests, it is a very important subject, and at some future time the paper will be done full justice to. Through attrition and opposition we step up higher. I believe very much in the attrition that grows out of the coming together of people of different minds and different convictions to express their ideas. Good always comes of it. Flint and steel are opposed in their elements, and when they come together a flash is evolved, and so when different minds come together light is emitted, new thought created, and new ideas extended. In that spirit this subject will be discussed on some future occasion.

Dr. Kingsley. Mr. President, in consideration of the lateness of the hour, I move that the "Herbst Method" be made a subject for discussion at our next meeting, and that Dr. Bonwill be invited to be present and take part in the discussion.

Dr. Bonwill showed his improved form of tooth-brush.

Adjourned.

S. E. DAVENPORT, D.D.S., M.D.S.,  
*Editor N. Y. Odontological Society.*

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#### ELECTION OF OFFICERS.

The annual meeting of the society was held at the Academy of Medicine, on Tuesday evening, December 14, 1886, and the following officers elected:

*President.*—E. A. Bogue.

*Vice-President.*—J. Morgan Howe.

*Recording Secretary.*—E. H. Raymond.

*Corresponding Secretary.*—C. F. Ives.

*Treasurer.*—Charles Miller.

*Curator.*—W. A. Bronson.

The Council (consisting of the elected officers) organized the following Monday evening, and made choice of S. E. Davenport for "Editor" for the year 1887. Executive Committee not yet chosen.

# FIRST DISTRICT DENTAL SOCIETY, STATE OF NEW YORK.

THE First District Dental Society of the State of New York held a regular monthly meeting, Tuesday evening, November 2, 1886, in the rooms of The S. S. White Dental Manufacturing Co., Broadway and Thirty-second street.

The president, Dr. William Carr, in the chair.

Dr. C. F. W. Bödecker, chairman of the Clinic Committee, reported as follows:

Mr. President and Gentlemen: We had a large and interesting clinic to-day. The attendance was about one hundred and ten. . . . Dr. M. L. Rhein filled a left upper first bicuspid, in the distal and grinding surfaces, by the Herbst method, and showed also in the mouth of the patient two central incisors which he had filled about three years ago with the mallet. The fillings looked well, and the edges were good. . . . Dr. Geran, of Brooklyn, filled a right lower first molar, on the grinding surface, by the Herbst method. . . . Dr. C. S. W. Baldwin showed a form of Logan crown. It was one of the ordinary Logan crowns with a stamped-up cap to go over the root. This cap was to be attached with a little soft solder to the Logan crown, and then replaced over the root and fastened with oxyphosphate, or any of the cements preferred. . . . Dr. Löwenberg tried to fill a right upper lateral, on the mesial and cutting edge, with Dr. F. A. Steurer's new gold and hand-pressure; but owing to insufficient undercut the filling came out in burnishing, after which he prepared a cavity in a left lower first molar, which he filled with this gold very nicely in seven minutes. . . . Dr. E. Parmly Brown exhibited some of his new porcelain crowns, which were half ground away, so as to expose the pins in the porcelain. This new pin, which was very perfectly imbedded in the porcelain, is placed in such a position that it cannot be pulled out, is not in the way of articulation, and does not detract from the strength of the tooth. . . . Dr. B. Hess exhibited a cabinet with abnormal specimens of extracted teeth. . . . Dr. O. F. Coe exhibited a model of a case of irregularity, or abnormal development. . . . Dr. George A. Mills exhibited a set of hand-pluggers which are corrugated on all sides, making them universal in their action, so that the gold may be compressed by both lateral and direct pressure. . . . I filled out of the mouth a tooth by the Herbst method, which is just roughly finished. I will pass it around. . . . Dr. C. J. Morey exhibited a patient with necrosis, corresponding to the right lower first molar in position. There was a fistulous opening just below the first molar. . . . I expected that Dr. L. B. Wilson, of Cumberland, Md., would be there to experiment with his new gold, but last night I received a letter stating

that it would be absolutely impossible for him to come to New York. I have here some of his so-called plastic gold, and as it has not been thoroughly tested, I will, after the meeting, distribute a little of it to several of the gentlemen, and ask them to report upon it either at the next clinic or at the next meeting. I should not like to take all the responsibility upon myself. Dr. Wilson also sent to us some curiosities of what he calls "successes," which I will also pass around. . . . Before closing I would like to call your attention to a very heavy burden that has been put upon me for a number of years. I constantly receive many letters of inquiry about cases, etc.,—over thirty during the last month,—and I would therefore request gentlemen who have anything to inquire about not to write me any more, because I cannot spend the time necessary to answer such letters. Any information as to cases or the Herbst method that may be desired I will be very glad to give to any one at the clinic, or even in my office.

Dr. W. H. Dwinelle. Mr. President, I was desired to supplement the report of the Clinic Committee in some few particulars, and I beg your indulgence while I do so. Reference has been made to the Wilson gold, that has been sent to us as a gold possessing certain peculiar qualities, and as being ten times more valuable than the gold we have been in the habit of using. On testing it we found that it is simple gold foil that has been dipped in a solution of copal varnish, or some kind of resinous varnish, which gives off an odor of a balsamic character. The adhesive property of the gold is dependent entirely upon the solution of shellac, or other varnish, with which it is treated. It is put into its place and cemented there by means of a warm burnisher, which simply warms or melts the shellac, as a hatter warms the shellac with his heated iron to induce the silken plush to adhere to the body of the hat. Of course, the smallest grain of common sense will teach us that there can be nothing permanent in operations performed with this gold. It comes in the form of coils. When touched with the flame of a lamp it ignites easily, and the varnish carbonizes or burns away in a moment, and you have nothing left but a very indifferent article of gold. Instead of gold they might as well substitute silver or any other metal that would not be easily melted. We felt as though it was almost an imposition to present an article of this character before a scientific body, or before people possessing the most ordinary common sense. In reference to the comparative merits of crystal gold, we have not yet had an opportunity for testing them or making comparisons. If you will give us your indulgence for another month we will endeavor to have something substantial to report. The Steurer gold has some very fine qualities. Of course I am wedded to my first



love, crystalline gold, and I think there is nothing better. I cannot concede that the Steurer gold is superior to it; nevertheless I will endeavor to be fair in the premises, and give you an impartial report at the next meeting.

President Carr. We will hear the report of the Clinic Committee on the special clinic of Dr. Younger.

Dr. W. D. Tenison. The chairman of the Clinic Committee, Dr. Bödecker, who was absent from the clinic, requested me to make a report of it. It was held on the 15th of October, and in consequence of the short time that was given to send out the notice cards there was not the usual number of gentlemen present. There were two patients, one of whom was to have a second superior bicuspid implanted. It was found that there was not room enough for the tooth, as the first molar and the first bicuspid had fallen together. The other patient preferred delaying the operation to some subsequent day. But Dr. Andrews had an inferior central that was dead and very much out of position,—he having lost, I think, the other one,—and Dr. Younger removed that tooth and implanted another. As it had fallen over, the socket was not in the proper position for implanting the tooth which he proposed to put in, and he was obliged to make a new socket; so that, although there was a partial socket there, the operation was practically the same as he performs when there is none at all present. He straightened the socket and implanted an inferior central. The tooth was very firm after being implanted,—so much so that there was no occasion to put ligatures on. I have not seen the case since, but have heard that so far it is a success. The gentleman told me that there was some little pain about it, but that he had gone through a great deal worse in other dental operations.

I do not know whether it is proper for me to say anything about the operation which Dr. Younger performed at my house before going to the clinic, as that comes under another head of the evening's proceedings, but so far as that operation was concerned to all appearances it was a success. There is one peculiar feature about this implantation of teeth that seems to me curious, and that is that no matter what color the tooth was in another person's mouth, or what color it may appear to have when implanted, it in the course of time takes upon itself the color of the other teeth in the patient's mouth.

#### INCIDENTS OF OFFICE PRACTICE.

Dr. L. Vanderpant, of Orange, N. J., exhibited models of two cases of supernumerary teeth, which he pronounced as the result of hereditary syphilis. They are from the mouths of young men about twenty-seven years of age, who could give very little history of the teeth except that they appeared at a very early period.

Dr. Tenison. Under incidents of office practice I wish to report an operation that was performed in my office by Dr. William J. Younger, of San Francisco. The lady, a private patient of mine, had worn for fifteen years a plate to support a single right superior central. I had almost persuaded her before Dr. Younger's arrival in New York to allow me to supply the loss by implanting a tooth; but when I learned that Dr. Younger was here I requested him to perform the operation. I hunted through the city for a suitable tooth, and finally succeeded in finding in the office of Dr. Hess a number of teeth, which he kindly gave me. Dr. Younger met the patient at my office in the morning of the day of the special clinic, October 15, and he then, without administering an anesthetic, performed the operation of implanting the superior right central. The lady bore up admirably under it. The tooth was ligated by Dr. Younger and the lady dismissed. The next morning I found a slight puffiness of the lip, and very slight swelling of the face, but no other bad results. A few days afterwards when I saw her again the swelling had disappeared. There was a little soreness, but she was quite comfortable; and about a week after the operation the tooth was very firm. It stood a little in front of the other central, and Dr. Younger, who was present at that time, removed the ligatures and put on others, to bring the tooth into better position. Last evening to my great surprise, I received a letter from the lady, stating that on Sunday the ligatures had come off and the tooth was so loose that she could move it with her lip. I immediately telegraphed her to be at my office this morning at nine o'clock. I had previously taken an impression of the mouth in English impression material. After sending the despatch I went into my laboratory and made a celluloid plate, with a button, or raised portion, behind that tooth. At nine o'clock this morning the patient was in my office, but to my gratification I found the tooth was very firm in the jaw, and in very good position. It had been without ligatures since Sunday, and it projected slightly, but it was very firm. I put the plate I had made into the mouth, brought the tooth into position, and tied it to it. The tooth is resting against the plate, and is firmly ligatured to it. The lady was overjoyed to find everything was in such good condition. The gums were looking very well indeed. There was no inflammation about them at all; and, as far as I can judge at the present time, the operation is a success. The color of the implanted tooth is entirely different from what it was when first placed in her mouth. It is now almost a *fac simile* of her own teeth in color.

Dr. T. B. Welch. How long had the tooth that was implanted been extracted?

Dr. Tenison. I cannot tell you. It had been extracted some

time. I do not imagine that there is any bony union at present. The tooth was pretty well covered with pericementum when it was implanted. I asked Dr. Younger how much of the root he had imbedded in the jaw, and I understood him to say about one-third. Then I asked the question whether he expected there would be any bony deposit around it towards the margin of the gum. He said there would be about one-third more on the labial surface and about three-fourths on the palatal surface, and that, together with the union of the gum, there would be perfect solidity of the tooth again. I cannot say anything more about this operation until time shall have demonstrated its success or failure. So far it appears to be a success.

Dr. C. N. Peirce, of Philadelphia, then read the following paper, entitled

#### RECUPERATIVE POWER OF A TOOTH.

That a tooth is a living organ with vital functions does not at the present day admit of a doubt. That its vitality is of a degree sufficient to preserve such an interchange of materials between itself and its environment as will serve to maintain its chemical and structural integrity, is not so well established.

In certain structures the life and nutrition of the tissues which constitute a complex organ may, in a very limited sense, be distinct from that of the organism of which the structures form a part, but so closely allied are they to it and its nutritional changes that the organ cannot be considered as a unit or as having an independent existence.

The activities of the organism are accomplished at the expense of nutrition, and the retrograde metamorphosis as well as the nutrition of individual tissues, or parts of tissues, is at the expense of the potential energy stored up from the assimilation of materials obtained from food. The activity of the glands, the respiratory movements, the heart's action, emotion, volition, and thought, are all directly at the cost of certain constituents of the various tissues concerned. In other words, work means waste, and the measure of the activity of any living mechanism is to be found in its excretions or discarded products. Tissue waste, however, is not necessarily commensurate with the material at the same time assimilated by any given tissue; it may be more or less. This relation between receipt of nutritive material by the organism and its appropriation at special localities is physiological order. Depletion as a sequence of abnormal systemic disturbance results in enfeeblement of the vital functions; hence local denutrition. Each organ, like the entire organism, is wasted in performing its functions, and has to restore itself



from the material it draws from the common fund. If, then, the pabulum furnished by the organism be deficient, the individual tissue or organ suffers; but if sufficient, or in excess, it will, under ordinary circumstances, maintain its integrity. In other words, anything that enfeebles the organism or modifies its vital functions disturbs the distribution of the nutritive material which is demanded either in the growth or in the maintenance of the organ's integrity. A further nutritional requirement is, that the pabulum furnished must contain those substances which are demanded for the recuperation of special organs, however much they may differ from other and contiguous tissues. That these conditions may all be fulfilled, and that each organ or locality be supplied with nutrition in proportion to its needs, the central nervous or regulating system must be able to exercise its functions in a normal manner.

The foregoing statements or aphorisms, if applicable to other structures, represent also the facts regarding the teeth and tooth-tissues.

Assuming your familiarity with tooth-development, let us consider the facts named in their relation to the recuperative powers of the tooth. We are taught that the processes of nutrition are localized in cells; that the cell alone is the essentially vital structure; and some biologists even limit vital activity to certain parts of the cell, mainly the nucleus, which they regard not only as the chief agent in the reproduction of the cell, but in its nutrition also; the periphery or outlying portions consisting largely of formed material in which nutritive changes have ceased. It is, nevertheless, through changes in this formed material that the function of the tissue is accomplished, and a tooth considered as a unit furnishes in the location, structure, and wear of its enamel a most excellent example of waste in exercise of function. In a certain sense the enamel is dead, holding no resemblance whatever to the living formative protoplasm from which it was derived, but playing an important though purely mechanical part in the life-history of the tooth, whose nutritive and vital processes are carried on in other parts or structures. We have in the tooth also a good illustration that in nourishment and restoration only certain portions of tissue have the power of reproducing out of pabulum, while other parts serve simply a mechanical purpose, giving form and durability to the organ or structures.

For the reproductive and recuperative processes of the tooth we must look elsewhere than to the dense, resisting and protective coronal covering, which holds much the same relation to the other tooth-tissues in its purposes as does the periphery of the cell to its nucleus, or the heart of the oak to its surrounding structures, which with it make up the massive trunk.

The dentine, a tissue of which the human tooth is largely composed, we find differently organized, and though originating from tissue not greatly unlike that of the enamel-germ, it is in location and function markedly differentiated from enamel. Its vital activities give evidence of a connection with the arterial and nervous system, which renders it subject to modifications through the general or systemic nutritive processes. Less dense in structure than enamel, dentine contains a much larger proportion of organic matter (the enamel of the adult tooth containing probably less than two per cent.). The dentine is permeated by tubuli, and, if we accept Prof. Heitzmann's teachings, also a network of protoplasm, which necessarily greatly exalts its capacity for vital changes.

The third dense tissue of the tooth, cementum, in its origin, its capacity for nutritional changes, and in density, is closely allied to the dentine, though differing from it in its methods of blood-distribution and the conditions which are dependent upon an increased supply of nutritive fluid. Notwithstanding the presence of this large per cent. of organic matter (dentine 28 per cent., and cementum 30), with increased nutrition and sensation, both the cementum and dentine in a normal condition are colorless, demonstrating that their nourishment must be derived entirely from the plasma of the blood, which differs from the hematoplasts, or red corpuscles, in coloring matter and chemical composition. The fats, phosphates, potassium salts, and iron predominate in the latter, while the plasma contains the chlorides and sodium salts.

A condition patent to every observing practitioner of dentistry is the modification, if not the complete arrest, of the progress of caries which so frequently accompanies the patient's approach to maturity. This fact, which is usually given as one of the evidences of the recuperative power of the tooth, is supposed to be a necessary result of an apparent increased density of tooth-tissue, because these conditions are so almost universally recognized at the same time. This increased density is, however, by some of our histologists claimed to be an assumption wholly unsustained; but the former statement regarding the occurrence of a period when there is a partial, and in many cases a complete, arrest of the progress of caries, is too fully substantiated to admit of a doubt. The error, oft repeated, is that this improved condition of the tooth-structure is itself an important factor in tooth-salvation, *while the truth is it is only a concomitant, and due to improved systemic conditions.*

Admitting without argument this asserted increased density of tooth-tissue, let us consider other reasons for this modification of the progress of caries. The period of life when this most frequently occurs is at a time when the systemic demand for the mineral salts

is somewhat abated by the completion of the osseous structures, so that, without any material change in the quality or quantity of the food consumed, there would be in the nutritive supply a surplus of the phosphates, chlorides, and sodium salts, which would naturally and unavoidably throw into the secretions an additional supply of these mineral products. The immediate local effect of these salts in the oral secretions would be to neutralize acids arising from food-fermentation, as well as to cause deposits upon the necks of some of the teeth, especially the inferior incisors. This accumulation upon the teeth is an intelligible explanation of the natural or unaided arrest of dental caries.

The presence of salivary calculus, due to a general or systemic cause, is indicative of the demand and supply resulting from a previous or present vital activity, and *gives local and positive evidence that the systemic conditions are not only favorable to tooth-preservation, but also to solidification of dentine and pulp-calcification.* To the several forms of secondary dentine styled osteo-dentine, dentine of repair, and dentine excrescence or nodular dentine, may also be added dental exostosis, excementosis, or hyperostosis, as my friend Dr. Abbott styles it. These are forms of hypernutrition with which you are already familiar. Some of these, though pathological in their influence, are nevertheless considered evidences of a recuperative power of the special tooth-tissue, and while developed in response to local excitation, their presence is dependent upon certain systemic conditions.

A recognition of this recuperative effort of the tooth should save the careful dentist from many an error, and enable him to treat to a satisfactory termination abnormal conditions and accidents which are of not unfrequent occurrence. This recuperative power should be recognized as an aid in the conservative treatment of exposed pulps, in the union of fractured roots, and as a factor in the processes by which relief from pain is secured when thermal changes are acutely recognized from the conductivity of a metal filling.

Good illustrations of this recuperative power are also to be seen in some teeth here exhibited with pulps thoroughly calcified, and in which acute sensibility was maintained until their extraction from the mouth of an individual of fifty years; also, in this model of a right superior incisor which was treated by my friend Dr. Pike, of Philadelphia, exhibiting the reunion of an oblique fracture, which had occurred across the root, the result of a blow. The coronal point of the fracture was at the palatine margin of the gum.

As already stated, the relation between receipt of nutritive material by the organism and its appropriation at certain localities is



physiological order. So, enfeeblement of the vital functions from systemic disturbances results in denutrition. The latter condition is not less an evidence of vital activity than the former, though the retrograde metamorphosis is usually styled pathological. In illustration of this law the writer had an interesting experience. A young lady (age, temperament, etc., not essential to the fact) was decidedly anemic; the central incisors were filled in superficial cavities, mesial surfaces; teeth subsequently became responsive to thermal changes. This condition continued with slight but annoying increase of pain for two years, for the last few months at times being almost unbearable, from which relief was temporarily obtained by large doses of quinia. The fillings were finally removed, and the pulps in both teeth were found to be fully exposed, with the pulp-chamber in the crowns much exceeding the normal size. The pulps were devitalized and removed, and the canals and crown cavities filled in the usual manner, resulting in an entire cessation of the pain. Had the receipt of nutritive material by the organism and its appropriation by the teeth been normal, the result would have been a deposition of dentine of repair and a diminution of the pulp-chambers probably continuing until their final obliteration in the crowns. The result, as it was, evidenced vital energy, and, had the demand of the locality been sustained by the organism, a very different termination would have been chronicled.

#### *Discussion.*

Dr. W. H. Atkinson. I am very happy to have lived to hear such a paper read before a dental society. But there is an impression on my mind that there are few who care even to follow the basal principles upon which our daily practice depends. This subject lies at the foundation of correct practice. It is but tentative; it is not pronounced doctrine. It is not proved, but it is cognate with my experience. It is similar to a case which I have detailed to you, that of B. C. Bent, the cornetist, whose incisors were fractured by a blow from a cricket ball. I secured them in place, and they returned to a healthy condition. The pinkish appearance of the crurine, that appearance seen in persons who have been over-treated with arsenic, and the fact that the teeth become firm again in the sockets, proves that there is recuperative power in a tooth. And it is not in the pericemental membrane at all, but it is at that locality. It is in the plasma. All nutrition takes place in fluids. The talk of nutritional change occurring in solids is the sheerest babble. Professor Heitzmann is the man who led us in the way to apprehend what we are talking about. I refer to the reactive power that is manifested after deterioration of tissue; that it must revert to the

embryonic condition by a process that goes down the ladder a few steps, bringing the tissue into that plastic condition where it is ready to receive the solution of lime and the chlorides and the phosphate of soda, potash and magnesia, so that they can build, by an effort of crystallization, the structure in a hardened and hypertrophied condition, and in an increased size. Those teeth in B. C. Bent's mouth are very remarkable, and I do not think we can always count upon having as good success as was obtained in that case. The plasma of the constitution has more to do with it than we have been willing to acknowledge. The ripening and churning of the digestory process that converts the food into plasma, so that the systemic powers can take hold of and convert it into protoplasm, embryonal corpuscles and the tissues belonging to the part, is too fine a point for lazy minds to grasp.

This is an auspicious night for such a discussion as this, because we have a kindred subject on the programme—that of implantation—which involves nearly the same principles. As a body we are not sufficiently erudite to talk about it except on a surface view.

The President. We will pass to the next paper, by George W. Weld, M.D., D.D.S., entitled

#### IMPLANTATION ET CÆTERA.

It has been said by some one that we judge of things in this life from the stand-point in which we view them. Nowhere, perhaps, is this truism more conspicuous than in surgical practice. The science of surgery is positive; it is not a thing of inspiration, but of labor and hard study. Thus, it is not the *operation* in surgical practice that brings distinction and honor, but rather the *good results* of an operation. Clearness of comprehension of the results likely to follow the operation of *implanting teeth* necessitates, in the first place, a few remarks on a kindred subject,—viz., *replantation and transplantation*.

Those of you who are acquainted with the literature of the subject will doubtless recollect that a few years ago I was an enthusiast in the matter of *replanting*, believing the practice to be both practicable and useful; but now, viewed from a stand-point of subsequent experience, I am forced to admit the fallacy of my former opinions. Temporary success inspired me at first with confidence. This has been the experience of every dentist, I might add, who has experimented on this subject, from the time of Ambrose Paré down to the present day. It is the temporary success of the operation that has made the practice for the past two hundred years so singularly erratic. As an unequal refraction of the lower strata of the atmo-

sphere on some lonely desert causes the appearance of water, and lures the thirsty traveller on to destruction, so the temporary success of those operations in the past has proved the illusion and the *fata morgana* of its continued practice.

The second volume of "The American System of Dentistry" \* contains a treatise on this subject, giving its complete history from the sixteenth century down to the present time. The author of this treatise states that this practice in the past may be compared to a protracted case of intermittent fever; a practice which has appeared to subside at certain intervals only to break out again with renewed force and ardor. And it is to be observed that with each renewal of the subject the parties endeavoring to distinguish themselves in this direction either claim that they have some new method of operating, or that their deeper researches and superior knowledge of the subject enable them to perform the operation successfully when others would fail. It was so in the time of Paré. It was so in John Hunter's time, when he caused a human tooth to grow in a cock's comb. It was so in my own case. It is apparently the same with Dr. Younger.

As above stated, I was encouraged at first by success,—so much so that the thought of *crowning teeth* in this connection seemed feasible, and therefore I had a special crown manufactured for that purpose. It was simply a porcelain crown, in the center of which there was a tapering screw. When a poor person came to me with a good natural root, with the crown nearly or wholly gone, it was my custom to extract the tooth, saw off the worthless crown at a point nearly opposite the margin of the gum, screw in the new porcelain crown with cement, replace the root in the socket, and wait for the process of repair to go on. This whole operation required only fifteen minutes of time, and resulted in a strong, useful, and inexpensive crown. It was a system of *cheap crowning*, the success of which depended wholly on the success of *replanting healthy teeth* associated with *healthy environments*. I reasoned at the time that the want of success in the past was in all probability due to the existence of a putrescent pulp in the canal of the root, or the dead matter in the *canaliculi* of the dentine in opposition with the protoplasmic bodies in the cementum, and that the presence of such putrid matter resulted in irritation to the surrounding parts and the final "dropping out" of the tooth. This view at the time, from my stand-point, looked reasonable; but in reality it was superficial, for, notwithstanding the careful removal of all dead matter in the canal of the root, the final result in almost every case was the same, viz., failure

\* "The American System of Dentistry, in Treatises by Various Authors." Edited by Wilbur F. Litch, M.D., D.D.S. Philadelphia: Lea Brothers & Co., 1886.



of the operation after a certain length of time, which varied in each individual case according to age, constitution, and environment.

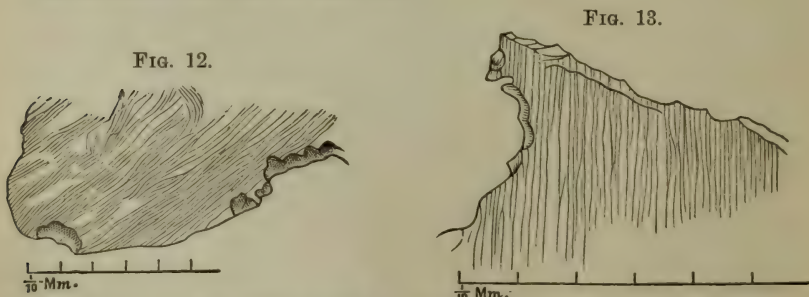
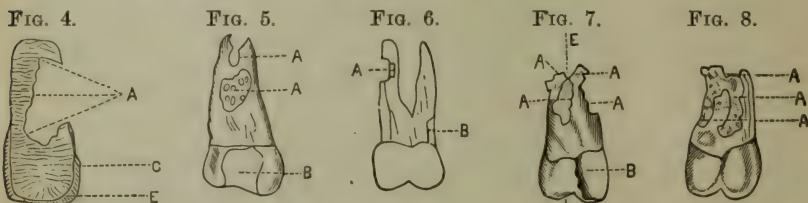
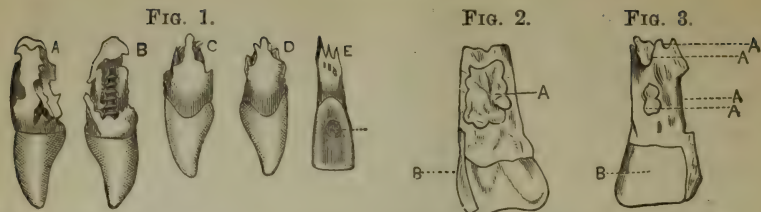
Here are a few cuts showing the manner in which the roots of *replanted* and *transplanted* teeth are absorbed.

[Through the kindness of the publishers of "The American System of Dentistry," we have been permitted the use of the illustrations referred to. See next page.—Editor DENTAL COSMOS.]

One of these specimens represents a root of a lateral partially absorbed, to which was attached a porcelain crown worn by a physician of this city for one year and three months, during which time it was apparently as firmly attached to the alveolus as any of his other teeth, which never had been disturbed in their sockets. In this case, as in nearly all cases, the root of the tooth is pitted with bay-like excavations, the result of absorption or disintegration of the cementum.

Dr. Younger, in his pamphlet on "Pericemental Life," claims that success in *implantation* is due to "*a healthy root in a healthy socket*," giving the reader to understand that the cause of failure in *replantation* and *transplantation* has been due to the unfavorable conditions and circumstances associated with the operation. Such a statement, however, is untenable in view of my own recorded experiments, which I have just mentioned, as well as in the light of the results obtained by other experimenters who have extracted sound teeth for the sole purpose of filling them out of the mouth, many of such operations being associated with *healthy roots* and *good environments*. There have been a number of theories advanced regarding the *rationale* of the process of repair and the retention of *replanted* and *transplanted* teeth in the jaw. John Hunter claimed that the "socket grew to the tooth, and that the success of the operation was founded on the fact of a disposition in all living substances to unite when brought in contact with another, although they are of a different structure and the circulation is carried on in only one of them." This statement, although brilliant as a generalization, is not sustained by modern experiments or clinical experience. "The purely mechanical theory that a tooth is retained in the socket simply by a contraction of the alveolar walls upon the root of the tooth appears hardly satisfactory or sufficient, in the light of modern pathology, to account for the *temporary strength* of the attachment."

The theory that a replanted or transplanted tooth is held in the alveolar socket by the formation of new bone remains, up to the present time, unproved, although by one or two observers it is claimed to have been seen. Mitscherlich claims to have seen *new bone* under the microscope, but only in one instance, and that in a microscopic section of a jaw bone of a one-year-old dog. The



absorption of the cementum, and the absence of any *new osseous deposit* in almost every case, however, lead to the conclusion that, if new bone is ever formed, such a formation is an exception to the general rule.

The most rational theory relating to the process of repair will be found in the treatise which I have already alluded to in "The American System of Dentistry," containing a contribution by Dr. W. Xavier Sudduth, whose views on this subject correspond with my own, and are substantially the same as those held by Dr. G. V. Black and others. Dr. Sudduth says that, in order to understand the nature of the re-attachment, it is first necessary to inquire into the nature of the attachment of teeth under normal conditions.

"Teeth are held in position in the alveoli by the peridental membrane, which unites with the alveolar wall on the one side and the root of the tooth on the other. Bone and cementum are analogous structures; they are not solid bodies, but are permeated by numerous canals, which here and there widen into larger cavities known as lacunæ; these canals are called canaliculi. The contents of the lacunæ are termed bone-cells; and the canaliculi locate the processes of the bone-cells. The same is true of the cementum which covers the dentine of the root. The fine processes of the bone-cells anastomose with the processes of other bone-cells. Union is also formed in a similar manner with the peridental membrane, with the cementum on one side and the alveolar wall on the other; thus the normal tooth is held in position. \* \* \* In the case of a replanted or transplanted tooth (and this applies equally as well to an implanted tooth), the canals in which were situated the processes of the cells of the cementum become empty, and into these the fine processes of connective-tissue which fill the alveolus force their way, and thus the attachment is made."

This probably accounts for the attachment of the tooth in a cock's comb, and also for the blood-vessels which Hunter said he found had permeated the structure of the cementum. "In the case of transplanted teeth more or less inflammation is set up, and granulation tissue fills in the interspaces between the sides of the tooth and the alveolar wall."

If a porcelain tooth be inserted in the alveolus, it will in time in many cases become temporarily attached; but the irritation incident to mastication causes it in a short time to drop out; without this irritation (like rifle-balls and other foreign bodies, which have been known to become incapsuled and remain in different parts of the body, where no irritation occurs for many years) it might remain for an indefinite period of time.

The irritation which results in the "dropping out" of the porce-



lain tooth induces the absorption of the cementum of the replanted tooth, which in turn results in its "dropping out."

The nature of the absorption, or the erosions that are formed upon the roots, which finally results in a failure of a great majority of replanted and transplanted teeth, is not fully determined; but it is very probable that it is physiological in character, and almost similar to the absorption so frequently seen on the roots of *healthy deciduous teeth*.

Dr. William Herbert Rollins, of Boston, states that "the microscopical changes wrought by it cannot be distinguished from that absorption seen in deciduous teeth with living pulps," and claims that these "lunar excavations seen in teeth with dead pulps are produced, as they are admitted to be in teeth with living pulps, by the agency of living cells." Wherever great cellular activity exists there will be found *giant-cells* or *osteoclasts*,\* sometimes called *resorption cells*. These giant-cells are found in various diseases wherever there is great cellular activity,—as, for example, "in miliary tuberculosis, syphilis, myeloid sarcoma, and in hyperplastic granulation tissue; they are also found in connection with the resorption of bone in normal development, and in the roots of temporary teeth and other bodies that nature desires to remove." (Sudduth.)

The absorption of the roots of replanted and transplanted teeth, as in the absorption of the roots of *healthy* deciduous teeth, is due to these giant-cells, or osteoclasts, and is the result of the physiological action of cells stimulated by irritation to increased cellular activity.†

The difference between replantation and implantation, irrespective of the tooth which is employed, is that in one case the hole in the alveolus which receives the tooth is natural, whilst in the other it is artificial, or gouged out of the jawbone with an instrument. In either case the tooth which is inserted will become sooner or later a foreign body, and will be subject to that law which nature unerringly provides in all such cases.

What is the difference in the process of repair between *implanted teeth* and those which I have described? Can their retention be accounted for purely on the mechanical theory? Can there be by any possibility a contraction of the cancellous structure of the jawbone? I think not. How can there be such a thing as a new osseous deposit? There is no periosteum! Dr. Younger claims that the

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\* Osteoblasts are bone-builders. Osteoclasts are bone-destroyers.

† Dr. Black states in this connection that the "resorption of the roots of the temporary teeth is effected by certain cells known as *odontoclasts*; resorption of bone in the physiological processes of change of form is effected by cells known as *osteoclasts*. Each of these processes is physiological," etc. (See "American System of Dentistry,"—"Diseases of the Peridental Membrane,"—vol. i, p. 922).

pericementum is endowed with a long life; that it is a marvelous tissue and (from inference at least) never dies; for he says that if this remarkable membrane be left out in the cold for a period of a number of years and then immersed in a weak solution of corrosive sublimate it will be resuscitated, and (if he means that new bone is formed) fulfill a function which it is extremely doubtful it ever possessed in its normal condition under the most favorable environment. In defence of his position he refers, by way of argument, to the vitality that is naturally inherent in the seed of a plant. Now, every *gardener* who knows anything about *gardening* knows that a seed, like everything else in this world, will in time lose its life principle; and experience decides him that old seeds are worthless because of the loss of the power of germinating; their life principle is gone; they are dead seeds, and accordingly are thrown away. If Dr. Younger had compared the *dead pericementum* to a *dead* seed instead of a live one, the analogy would have been correct; as it is, the comparison is unjust and the statement misleading.

I might touch upon other interesting points in this connection,—as, for instance, the structure of the pericementum, the character of its cells compared with other cells, and the great improbability of their possessing any inherent life principle.

Agassiz truly described the difference between a *living cell* and a *living egg* when he said that, “while we recognize the identity of cell-structure and egg-structure, we must not forget the great distinction between them,—namely, that while the cells remain component parts of the whole body the egg separates itself and assumes a distinct individual existence. \* \* \* Every egg is such a center, differing from the cells around it but by the principle of life in which its individuality consists, which is to make it a new being, instead of a fellow-cell. \* \* \* This intangible something is the subtle element that eludes our closest analysis; it is the germ of the immaterial principle according to which the new being is to develop. The physical germ we see; the spiritual germ we cannot see, though we may trace its action in the material elements through which it is to be expressed.”

Agassiz compared a *living cell* with a *living egg*, and drew conclusions favorable to the egg. But Dr. Younger's statement regarding the vitality of the pericementum, if it means anything, means a comparison of a *living egg* with a *dead cell*, and the conclusion which, so far as this *vital principle* is manifested, is rather favorable to the *dead cell*.\*

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\* The fact that Hunter successfully replanted teeth which had been subjected to the heat of boiling water, is only additional proof that the periodental membrane is incapable of prolonged vitality and has nothing to do with the physiological process of repair.

The truth is, the deeper one goes into the subject the more one is obliged to believe that Dr. Younger is mistaken, and that the old and dried up pericementum has nothing whatever to do with the repair and retention of an implanted tooth in the jawbone.

John Hunter, who was a careful observer, convinced himself and, I think, a great majority of those who have read the published results of his experiments that the presence or absence of the pericementum made no difference apparently regarding the time or the strength of the re-attachment; for in those cases where the pericementum was entirely removed, and even the cementum filed away and the end of the root cut off, he found that they would take hold as quickly and be retained for as long a time as those teeth the roots of which were completely covered with a freshly extracted pericementum.

The *rationale* of the process of repair between an *implanted* and a *replanted* tooth seems to be almost identically the same. By what process of deduction, then, in the light of modern biology, are we to expect different results in the practice so highly recommended by Dr. Younger from those results which we know generally follow the operation of replanting or transplanting teeth?

A celebrated physician of New York, the late Dr. Austin Flint, was to have read a paper before the British Medical Association at its meeting in 1886. The manuscript was prepared, but the hand which wrote it is at rest, and the voice which was to have pronounced it is silent forever. But in his unexpected farewell words he predicted that "during the next fifty years the history of medicine will have a steady acceleration in progress; that our knowledge with reference to anatomy, histology, and chemistry will advance; that our senses will be aided and augmented; that hearing will be vastly improved by means of microphonic stethoscopes; that a judicious blood-letting will be revived, and the lancet will again find a place which it lost through over use; that bacterial etiology will be established and revolutionize the treatment of certain diseases; that the little understood functions of the spleen and liver, the thyroid body, the lymphatic glands, the supra-renal capsules, offer problems which will form a vast and fruitful field for future clinical researches."

The physiological fields of *replantation* and *implantation* have already been explored by such men as Hunter, Berdmore, and Bell, and of more recent date by such men as Waters, of Boston, and Thomas, of Detroit. There is little or nothing in them but disappointment and failure.

Let me kindly suggest to those who may now be contemplating experiments in this direction to turn their attention to other and



better fields of investigation, where there is more chance of success, and where fame and honor are to be found.

### *Discussion.*

Dr. Carl Heitzmann. Gentlemen, I congratulate Dr. Weld on the honesty and truthfulness that is displayed in his paper. In fact, he anticipates a great many things that Dr. Younger very likely in a few years will have found out himself. But will Dr. Weld allow me to ask a very serious question? What has induced him, such a good and faithful observer, to search for truth in Philadelphia, and from such an authority as Sudduth, when here in New York he could have had the best possible chance to satisfy himself with his own eyes about what is going on? Just think of it: a theory as announced by Dr. Sudduth and faithfully quoted by Dr. Weld; the theory that the lacunæ and canaliculi, so long as the cement is alive, contain, say, protoplasm, but as soon as the cement is dead there are hollow spaces left, and that the connective-tissue fibers would grow into those hollow spaces and hold the tooth to the socket. It is an easy thing to satisfy one's self by experimenting upon a dog. We can implant a dead tooth in a dog's mouth and watch it for a few months; then kill the dog and cut out a piece of the jaw and examine the tooth and its socket; and there you would have the whole truth. What is the need for all this question about why a tooth becomes solid? Do we not know that a foreign body introduced into the organism will produce an irritation in the enviroing tissues? Will not that irritation cause hypertrophy or hyperplasia? Is not that sufficient to explain why a replanted tooth is for a time firmly attached to the socket, just as a gun-ball lodged in the tissues is attached to its surroundings? Is not this enough to explain the apparent puzzle that irritation produced by the introduction of a foreign body will gradually tend to a new formation of tissue, in a way which is detrimental to the foreign body itself?

I was greatly amused a short time ago by reading an article in one of our leading medical papers. I saw that a great Frenchman had made the most beautiful discovery in the world,—that is, if you put a piece of sponge into living tissue, that sponge becomes vitalized and produces new blood-vessels and new tissues. More than that, the Frenchman has discovered that if you introduce into living tissue a piece of India-rubber, the rubber is filled with blood-vessels and becomes vitalized and changed into the tissues of the animal. The fact is well established that a foreign body introduced into the tissues, if it is composed of yielding material, such as sponge, bone, or ivory, is gradually absorbed; but it is not vitalized. It is attacked from without by a growth of the animal tissues, and is

destroyed by erosion and absorption. Billroth has shown that to be a fact by experiments upon animals. Dr. Weld speaks of the life of the cells, and he quotes some American authorities; but the first genius who spoke about how these excavations are produced was a Frenchman, Magitot. He says that the pus-corpuscles in pericementitis begin to kick and work against the cementum, and the result is a hole. Just think of it: pus corpuscles boring a hole in that bony, dead structure! It is much the same thing when a man says the connective-tissue fiber bores its way into the canaliculi. Before that connective-tissue fiber can change at all it must, as Dr. Atkinson correctly says, first become protoplasm and return to the medullary condition. But a connective-tissue fiber, creeping and boring its way into the canaliculi,—I must say, gentlemen, that is too much for me.

All these questions have been discussed, and are very easily settled. It is shown that dead tissue becomes supplied with blood-vessels; but would you think that dead tissue is vitalized and forms tissue itself? No. The surrounding tissues grow into the dead part. I had the pleasure of seeing Dr. Younger in my laboratory recently. I thought that this honest-looking Californian ought to examine specimens and satisfy himself that he is wrong, if he claims that once dead pericementum, that has been out of the mouth for months, weeks, or days, can be vitalized. Dr. Weld's experiments show that a tooth that has been out of the mouth for days, or for fifteen minutes, is dead. It is not lost immediately after being planted, because of the hypertrophied condition of the pericementum; but as soon as there begins a growth into the pericementum the tooth must become loose, and be ultimately lost. I am surprised that this process of expulsion may take so long as five years. Still, it is a fact that in the mouths of healthy people such teeth can last five years. Dr. Younger will come to the same conclusions in regard to implanting teeth that Dr. Weld and others have arrived at.

Dr. F. Y. Clark. Facts are stubborn things sometimes. I do not mean to deny what has been said on this subject by the gentlemen who have preceded me, but I know positively, by cases in my own practice, that teeth can remain out of the mouth for several hours, be put back, and serve a good purpose for twenty-five years. I know of one instance of that kind, a gentleman in New York City. A tooth was knocked out, and remained out for about three hours, was replaced, and he has it yet. Facts are stubborn things, and do not always agree with theory. That case would appear to upset a little of the theory that has been advanced to-night.

We have heard a great deal said about dead teeth. What is a dead tooth? This is a very difficult question to answer. We used

to think that all teeth the pulps of which had been destroyed were dead teeth; and it was our practice to extract them, believing they were dead and useless. We do not now consider them dead at all, but very live teeth. In my practice I have very frequently seen teeth that had been knocked out put back and do good service again. That is what we call replanting. This implantation is to me an entirely new thing. It seems to me very inconsistent in many respects. I have been told that there is no danger of conveying hereditary taint or disease, but I should doubt that very much. I should be very loth to implant a tooth taken from the mouth of a person whose history I was not perfectly familiar with, as well as the history of the tooth. My friend Dr. Atkinson says there is no danger. Perhaps he can explain that; I cannot.

Dr. W. J. Younger. Gentlemen, I have not come here with the purpose of stuffing theories down your throats. I have made a wonderful success in implantation of teeth, and of course I had to make a theory. When we do anything we must account for it; so this theory of the vitalization of the pericementum suggested itself to me as being the most natural one. Every part of our body has some vitality of its own. What is vitality? Is it the principle of life? Who can tell? When a thing dies it is from want of nutrition—it starves to death. But whether it can be brought back to life again is something that we cannot say anything about. We know that frogs and toads have remained inclosed in rocks and earth, cut off from nutrition, for a hundred years, and have come back to life at the end of that time. Some of the operations I have performed are before you, and you can see them every day, and you can watch them for years. This is simply following out the same general course which I have pursued for years. My first case of pure implantation is but seventeen months old, but the same principle was applied by me five years ago. As to absorption, I do not know why Dr. Weld met with that difficulty in the teeth he implanted. Out of one hundred and twenty cases in my practice I have had but one case of absorption. All I can say upon that point is that Dr. Weld did not perform his operations properly, or not as I performed mine. I merely come here to tell you and show you what I have done. In the course of two or three years you can decide whether it is a success or not.

Dr. F. Y. Clark. How do you disinfect the teeth before implanting?

Dr. Younger. By a solution of the bichloride of mercury, one part in a thousand. In one case which I showed to the members of the profession in California I had forgotten which tooth was implanted, and when I looked in the lady's mouth I could not tell which one it was, nor could she tell.



Dr. Atkinson. I feel grateful to these gentlemen who have presented to us the two papers to-night. I think we ought to thank them with sincere gratitude for their willingness to give us the honest convictions of their own minds, resulting from their own observations. And if we want to be believed ourselves let us, for fraternity's sake and for truth's sake, treat gentlemen who bring us the results of their observations as though they were as honest as we are ourselves. Dr. Heitzmann spoke his mind strongly, but yet so kindly that Dr. Younger could not take offense.

If we will look back a little at the progress of our own society and our own special calling and see what it has been and what it is, and what we hope it will be, we will be able to stand more and more firmly.

I feel very grateful to Prof. Peirce for what he has given us, even though I do not accept the interpretation that he puts upon it. And Dr. Weld has done us a great service, if we had the intelligence to appreciate and take hold of it. That paper of his indicates an amount of research that is immense. He has either read very largely or been inspired very brilliantly to give us such a *résumé*. The facts are interesting to us, although we may try to show him what we esteem a better way.

What is history? The learned men have always ignored the boys. The old fogies always say, "That never can be; oh, no, no." But the inspired youth goes on, and in a little while proves his position, and then you hear the old fogy say, "Why, we always told you so." That is history. Let us discriminate the process of the growth of our own apprehension a little more closely and honestly, and we will not be so very facile to forget the hole whence we were digged. The moment we get the illumination to understand what a man means we will find that there is not so much difference among mankind as there seems to be when they are advocating a special subject.

That lady's case that was exhibited before the Odontological Society at the Academy of Medicine is sufficient to satisfy me that the principle at the bottom of this operation is a correct one. I could not, by the best scrutiny I could give, discover any difference between the implanted tooth and the replanted teeth and the teeth that had never been out of the mouth; and I think I have some little mother-wit about me and some clean-cut and educated observation, and just as much honesty of heart as any man can have. And they tell us that it is the normal experience in these operations that the teeth which when implanted did not accord in color with the teeth in the mouth become in a little while as if to the manor born.

I have placed but one tooth in a new socket. Arrangements had been made for Dr. Younger to perform the operation at the office of Dr. Woodward. He did not arrive at the appointed hour, and at Dr. Woodward's suggestion I went on with the case, and had nearly completed the operation when Dr. Younger came in. I am told that the patient had no trouble in eating with that tooth from the beginning. I saw it a week or so afterwards, and it was then quite firm.

Do you think I know whether a tissue that I see is inflamed or not? I tell you there was not a sign of inflammation around that tooth; there was no effusion whatever in the myxomatous tissue. I am to put another tooth in that same mouth, where the root has been out for a long time,—I don't know how long. When we shall have watched these cases a while it will be time enough to crucify Brother Younger. He is too intelligent and honest and earnest to allow us to ignore what he tells us frankly, and what is supported by fifteen or twenty of the best dental operators on the Western Slope.

I acknowledge that I did not take to this thing very strongly when the reports reached me of these operations, and when I saw and studied it closely I did not really apprehend it. Although the light shone in me, the darkness comprehended it not, until I saw the lady at the Academy of Medicine who had in her mouth one implanted and two replanted teeth; then, I said, I can easily enough believe the rest. That case enables me to form a judgment—a judgment that I respect more than I respect the judgment of many other men on this planet. That is not egotism, but the result of an earnest desire for the truth and to be able to make use of it. In all past history men have attributed power to the tissues that are composed or made up of the various atoms, and they have ignored that thing or essence that we call power that is outside of and behind all these operations.

Ridicule has no part in fraternity. We can only reach the highest grade by treating all earnest men with respect, and by pooling our issues, and not finding fault with new propositions before examining them. If you turn a man around and eye him with suspicion, will you elevate him very much? But if you give respectful consideration to every earnest and honest effort, it will not be long before you will find there is something in every man that is worthy to be taken hold of and utilized for the general good.

Adjourned.

B. C. NASH, D.D.S., *Secretary.*

## EASTERN ILLINOIS DENTAL SOCIETY.

At the first meeting of the Eastern Illinois Dental Society, held at Danville, November 30, 1886, the following officers were elected: Charles R. Dwight, president; G. O. Shafer, vice-president; E. W. Sheriff, secretary.

The next meeting will be held at Paris, Ill., on the third Tuesday in March, 1887.

G. O. SHAFER, *Vice-President*,  
Champaign, Ill.

## NEBRASKA STATE DENTAL SOCIETY.

At the tenth annual meeting of the Nebraska State Dental Society, recently held at Beatrice, the following officers were duly elected for the ensuing year: W. F. Roseman, president; A. W. Nason, vice-president; I. W. Funck, recording secretary; Allen Fones, corresponding secretary; W. H. Stryker, treasurer.

The next meeting will be held at Hastings, Neb., May 17, 18, 19, and 20, 1887.

W. F. ROSEMAN, *President*,  
Fremont, Neb.

## ST. LOUIS DENTAL SOCIETY.

The officers of the St. Louis Dental Society for 1887 are as follows: M. C. McNamara, president; Henry Fisher, vice-president; W. N. Morrison, corresponding secretary; John G. Harper, recording secretary; A. J. Prosser, treasurer.

JOHN G. HARPER, *Rec. Sec.*,  
No. 516 Walnut street, St. Louis, Mo.

## EDITORIAL.

## THE FIRST DISTRICT DENTAL SOCIETY'S ANNIVERSARY.

THE eighteenth anniversary of the First District Dental Society of the State of New York, the programme of which was published in the DENTAL COSMOS for January, resulted in the gathering of six hundred and eighty dentists and dental students,—a professional assemblage without parallel in the history of dentistry in this or any other country. The mere statement of this fact renders unnecessary the use of adjectives in further description.

The guests of the society represented all sections of the country, making emphatically a national convocation, an aggregation of professional notabilities such as was certainly never before convened at the invitation of any society, local or national.

The programme was carried out in all its essential details, with numerous additions not in the bill.



The variety of the clinical demonstrations and the skill in special directions of the several operators gave an unusual interest to the meeting, and an opportunity for instruction such as has never before been available at any one time and place. The halls of the New York College of Dentistry were thronged with interested spectators in constant attendance through every hour of the day.

The interest culminated on the evening of the last day, at the banquet, at which about one hundred and fifty were present. It is needless to say that the *menu* was all and more than should have been desired by anyone, and the speeches which followed were received with a cordiality that testified to the genial spirit which prevailed. Altogether the meeting was one never to be forgotten by those present, and will doubtless exercise an influence which will be felt on the future of dentistry.

We have reserved for a closing paragraph allusion to an incident which was a surprise both to the society and its guests. Dr. N. W. Kingsley, availing himself of the opportunity afforded by a call to respond to a toast, announced that he had something to eat not on the *menu*, and proceeded to say that he desired to recede from the position taken in the paper recently read entitled "Dentistry Not a Specialty in Medicine." He acknowledged his conversion, and his willingness, however unpalatable it might be, to eat his own words, not only withdrawing all opposition to the Dental Section of the International Medical Congress, but pledging himself to give it active and hearty support. The announcement was greeted with more enthusiasm than had been created by any other utterance, and the applause was general and without any indication of dissent.

This unexpected sommersault and the manner in which it was received mark the withdrawal of all effective opposition to the Dental Section, and insure its success. The project, which has been discussed in several quarters, for an International Dental Congress, in lieu of a Dental Section in a Medical Congress, it was understood should be temporarily left in abeyance, and meanwhile all were urged to concentrate their efforts to make the Section of Dentistry in the forthcoming Medical Congress a credit to the dental profession.

If the meeting of the First District Society had had no other outcome but this reconciliation of opposing elements, it would still be entitled to congratulations and thanks.

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### THE DENTAL SECTION OF THE MEDICAL CONGRESS.

IN the January issue of the DENTAL COSMOS we presented some reasons why all dentists should unite in an earnest effort to make the Dental Section of the International Medical Congress a credit

to the profession. The time remaining for due preparation is so short that harmonious action ought to be secured without delay, even though involving an unhesitating sacrifice of all personal piques and prejudices. The various local societies should at their next regular meetings, or at special meetings called expressly for the purpose, give assurance to the officers of the Section of their sympathy, and prompt, generous, and hearty support. As we wrote a year ago, "anything less than a creditable presentation of dental science and art would be emphatically *discreditable*,"—a reproach which we sincerely hope may be honorably averted.

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### THE ESTHETICS OF PROSTHETICS.

CONTRARY to our usual custom, we feel justified in calling special attention to the paper read by Dr. J. Rollo Knapp, of New Orleans, at the special January meeting of the First District Dental Society of the State of New York, and published in this number of the DENTAL COSMOS. The terse and plain descriptions, with the accompanying illustrations, will enable the reader to readily comprehend the successive steps of the operations described; but neither writer nor engraver can adequately represent the exquisite forms and finish of these combinations of gold and porcelain; they must be seen and handled in order fully to appreciate the skill, taste, and judgement of the artist.

It is not too much to say that the merely mechanical execution of the hundred or more specimens exhibited shows a refinement of manipulative ability through the several processes involved in their construction which stamps their author as a workman possessing the highest order of natural and acquired talent in this special field. To this we must add that the beautiful reproductions in gold of the natural forms of the several classes of teeth show an artistic ability in keeping with the mechanical skill displayed. It is impossible to see and examine these achievements of Dr. Knapp without a feeling and expression of admiration amounting to enthusiasm.

Dr. Knapp has laid the dental profession under lasting obligation by this effort to teach all who have the capacity to learn the methods by which he attains such beautiful results.

These comments are, however, not intended to be merely nor chiefly eulogistic of Dr. Knapp. They have a far wider object than compliment to one whose skill and unselfishness are only equalled by his unaffected modesty. It is the possibilities of esthetic and prosthetic dentistry thus demonstrated that we desire to emphasize. Such exhibitions go much farther than words to lift the depreciated if not despised avocation of the "mechanical dentist" to the level

of the highest attainments of the most renowned operative dentists, whose elaborate contour work is equaled if not surpassed in the laboratories of the modern mechanical dentist.

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### THE "WESTERN DENTAL JOURNAL."

As we go to press we have the pleasure of welcoming to fraternal fellowship the initial number of *The Western Dental Journal*, the publisher's announcement of which we noticed in our January issue.

The publishers and editors are to be congratulated on the appearance and contents of the *Journal*, and we hope that successive numbers will maintain the standard, thus deserving and securing appreciation and success.

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### THE SITUATION.

WE noted in our January issue the unusual pressure of matter which compelled the addition of an extra form to that number. A like condition necessitates a like supplementary addition to this issue. But the appreciation of our readers and the increase of our subscription list compensate for the consequent outlay, and we congratulate ourselves as well as our subscribers on the outlook for 1887.

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TRANSACTIONS OF THE AMERICAN DENTAL ASSOCIATION, at the Twenty-sixth Annual Session, held at Niagara Falls, N. Y., commencing on the 3d of August, 1886. Philadelphia: The S. S. White Dental Mfg. Co., 1886.

There is no doubt of the permanent value of the annual printed transactions of the American Dental Association, as this body reflects in a large measure the best thought of the leading minds of the profession. This year's volume contains nearly two hundred pages, which, besides the minutes of transactions, are devoted to reports, papers, and discussions on a variety of subjects of current interest to the profession. The Herbst method received pretty exhaustive treatment, the presence of Dr. Herbst at the meeting serving as a stimulus to its thorough discussion. Typographically the pamphlet is neat, and is printed on paper of agreeable tint and texture.

### PAMPHLETS RECEIVED.

Transactions of the Louisiana State Dental Society, at the first annual meeting, held at New Orleans, commencing on the 4th of



March, 1886. Philadelphia: The S. S. White Dental Manufacturing Co., 1886.

Transactions of the California State Dental Association at the thirteenth, fourteenth, fifteenth, sixteenth, and seventeenth Annual Sessions, held at San Francisco, 1882-1886. San Francisco: Women's Coöperative Printing Office, 1886.

Dentistry Not a Specialty in Medicine. An Address delivered before the New England Dental Society, at the annual meeting, Boston, October 7, 1886. By Norman W. Kingsley, D.D.S., president of the Dental Society of the State of New York. Reprinted from the "Independent Practitioner" of January, 1887.

Caulk's Dental Annual, Number V, 1886-1887. Devoted to the Collection and Dissemination of Statistics Relating to the Business and Practice of Dentistry. L. D. Caulk, D.D.S., Editor and Publisher, Camden, Del. Price, 50 cents.

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## OBITUARY.

### WILLIAM PERRY, M. D.

DIED, in Exeter, N. H., January 11, 1887, Dr. WILLIAM PERRY, in the ninety-ninth year of his age.

Dr. Perry was born in Norton, Mass., December 20, 1788; received the degree of M. D. from the Harvard Medical School in 1814, and continued in active medical and surgical practice until considerably past his eightieth year,—indeed he had passed ninety ere his professional work could be deemed concluded. His death was due to extreme age, and he passed the bounds of this life without manifest consciousness. Of his wide medical reputation and noted surgical achievements we need not here speak, but call attention to the significant fact that in early times, before dentists abounded, he often filled teeth and made artificial sets cut from hippopotamus tusks; and dentists have borne willing witness to the thoroughness of his fillings as they found them in teeth long afterwards extracted. He was noted for several curative devices resulting from his mechanical and inventive skill. In fact, Dr. Perry was a practical embodiment of human faculties trained for useful exercise, and a conspicuous example of the competent physician practicing dentistry as a specialty.

## JOHN ROBERTS, D.D.S.

DIED, in Southsea, Hampshire, England, January 1, 1887, JOHN ROBERTS, D.D.S., in the thirty-first year of his age.

Dr. Roberts was born at Haverfordwest, Pembrokeshire, Wales, in 1856. He was a thoroughly skilled workman, and would no doubt have made himself a name had his life been spared. He spent fifteen years in acquiring the prosthetic art, and graduated at the New York College of Dentistry in March, 1885. He practiced with Dr. Wheeler, at Albany, N. Y., until October of the same year, when he had an attack of hemoptysis, which compelled him to return home. He ultimately died of congestion of the lungs. He was generally esteemed for his sterling qualities, as well as for his gentle and kind ways.

## DR. S. A. McDOWELL.

DIED, at his home in Carlisle, Pa., on the 3d of January, 1887, after a brief period of unconsciousness, of paralysis of the brain, Dr. S. A. McDOWELL, aged fifty-eight years.

A more extended notice will appear in our next number.

## PERISCOPE.

A SPECIALIST ON SPECIALISM.—Those of us entering practice twenty years ago found men plying medicine as a trade, regarding patients as the physician's private property, not to be trespassed upon by strangers, often controlling such patients by appeals to their ignorance, fears, and prejudices, and substituting in their own persons an acquaintance with the weaker side of human nature, useful for financial purposes, for an exact scientific acquaintance with disease, to be used for the benefit of their race. The specialist was the pioneer into this latter realm, and, like all such, was too frequently a martyr to his cause. But he represented that majority which consists of one with truth upon his side, and, like all other such majorities in the history of the world, he has finally won his way to victory. The "elaborate division of labor" is "as useful and successful in a learned profession as it is in the mechanic arts," for the whole matter is a relative question of height of standard. General medicine itself is too often only special attention to such diseases as may prove rapidly fatal; and neglect, or often worse than neglect, of all other maladies. It is itself merely an abnormal, ill-defined specialism, substituting multa for multum, and, like the young cuckoo, insisting upon the sole control of its illegally held habitation. Specialism substitutes quality for quantity, which substitution is the distinguishing mark of the civilized man from the savage; nay more, the essential criterion of advancement in civilization itself.—*Dr. Edward Wigglesworth; Trans. of Amer. Dermatological Association.*

**THE FUNCTIONS OF THE TONSILS.**—Dr. R. Hingston Fox, in the *July Journal of Anatomy and Physiology*, discusses the functions of the tonsils, and advances some interesting ideas in regard to them which to many will also be novel. These adenoid glands belong to the digestive and not to the respiratory function; the air respired through the nose passes through the pharynx posterior to them, they, when the mouth is closed, resting against the tongue and shut off from the pharynx. They are not, the writer contends, to lubricate the fauces and aid in deglutition, as has been claimed. From their structure, which is similar to the solitary agminated glands in the intestine, he reasons that their function is absorbent. He announces his belief that "the function of the tonsil is connected with the stream of saliva which is poured over it, without cessation, day and night," absorbing from the saliva in the intervals of meals certain of its constituents which would be otherwise wasted. The adenoid tissue of which the tonsils are composed may be regarded as the birthplace of leucocytes. The materials, according to this theory, which might be wasted by the stomach, are intercepted by these glands, and made to minister to the growth of white cells.

He closes his article with this explanation of the atrophy of the tonsils which takes place in middle and later life:

"Adenoid tissue everywhere is more largely developed in childhood, when not only nutrition but growth has to be provided for, than it is afterwards. And there is nothing surprising in the fact that these nurseries of young leucocytes (permit the fancy), planted here as it were by the riverside, and drawing their sustenance from the nutrient stream, should dwindle in later life when the demand for white cells has become much less."

The writer does not discuss the effects, if there are any, which the removal of tonsils in childhood (a not infrequent surgical operation) might occasion.—*Medical Record*.

**IODINE IN THE TREATMENT OF GLANDULAR SWELLINGS.**—In an address on "Practical Therapeutics," read at a recent meeting of the Medical Section of the Academy of Medicine in Ireland (*Dublin Journal of Med. Sci.*, December, 1886), Dr. James Little says: "In the United Kingdom thousands of pounds are annually expended in the purchase of iodine, which, after solution in spirit, is applied to enlarged glands in the neck and elsewhere in the body to promote their disappearance. The impetus to the employment of the iodine was given by Lugol fifty years ago, and given so strongly that it has reached our days apparently with undiminished force, and quite recently rather acrimonious discussions have taken place as to the merit of rendering the application colorless. Yet its value is a matter on which every practitioner should be able easily to form his own judgment, and any one who does so independently will, I think, soon arrive at the conclusion that if the solution employed, whether it be colored or colorless, is a weak one, such as the pharmacopœial tincture, no effect whatever is produced; whereas, if it be a strong one, such as the pharmacopœial liniment, the result is that the enlarged glands get more enlarged, and if the application is continued an abscess forms in the surrounding cellular tissue."—*New York Medical Journal*.



**A SOLVENT FOR SORDES.**—Dr. A. D. MacGregor speaks highly of boric acid as a topical application in the unhealthy condition in which we frequently find the mouth, tongue, and teeth in severe cases of typhoid fever. He says in the *British Medical Journal*: The mouth is hot; the lips dry, cracked, and glued to the sordes-covered teeth by inspissated mucus and saliva; the tongue dry, or even glazed and hard, brown, or black, and crusted with a fetid fur. Under these circumstances a pigment containing boric acid (30 grains), chlorate of potassium (20 grains), lemon juice (5 fluidrachms), and glycerin (3 fluidrachms), yields very comforting results. When the teeth are well-rubbed with this, the sordes quickly and easily becomes detached; little harm will follow from the acid present. The boric acid attacks the masses of bacilli and bacteria, the chlorate of potassium cools and soothes the mucous membrane; the glycerin and lemon-juice moisten the parts and aid the salivary secretion.—*Medical Record*.

**CARIES IN THE MASTODON.**—Prof. Leidy directed attention to a specimen consisting of the posterior portion of a last upper molar tooth of the mastodon, which he had attributed to a species under the name of *M. floridanus*. It is remarkable from the circumstance that it apparently exhibits the result of caries, a condition of which he had never previously observed an instance in extinct animals. The supposed caries appears as an irregular excavation immediately above the crown of the tooth, about four lines in depth. The mouth of the cavity is elliptical, extending one and one-fourth inches transversely and one-fourth of an inch vertically. The surface of the cavity appears irregularly eroded.—*Proceedings Academy of Natural Sciences, Phila.*

**BORIC ACID IN DISEASED CONDITIONS OF THE MOUTH.**—Boric acid has been found useful by D. A. D. Macgregor (*Brit. Med. Jour.*) in various diseased conditions of the mouth, and has been applied in the form of powder, confection, and as a gargle combined with glycerin. A good antiseptic *tooth-powder* is made from boric acid 4, potassium chlorate 3, guaiacum resin 2, prepared chalk 6, and magnesium carbonate 33 parts.—*Am. Jour. Pharmacy*.

**ANTISEPTIC MOUTH-WASH.**—Dr. Miller found that by using the following mixture he could completely sterilize the mouth, cavities in carious teeth, etc.: Thymol, 4 grains; benzoic acid, 45 grains; tincture of eucalyptus, 3½ fluidrachms; water, 25 fluidounces. The mouth is to be well rinsed with this mixture, especially just before going to bed, since most of the damage by fermentative and putrefactive processes in the mouth is done at night, during sleep, unless the exciting cause be previously removed or rendered inert.—*Pacific Record*.

**CURE OF A LINGUAL ULCER BY GALVANISM.**—Dr. Meyer has employed the galvanic current with success in the treatment of a very painful ulcer of the tongue which had existed nine years. The current employed was of sufficient strength to be felt without causing any pain. The positive pole was held in the hand while the nega-

tive pole was applied for thirty seconds to the most painful points. The pain was quieted for several hours after the first sitting. The treatment occupied about eighteen months, with two intervals of six weeks each. The total number of *séances* was one hundred and ninety. A perfect cure was reported to have been obtained.—*Journal de Médecine de Bruxelles*.

A PHYSICIAN'S INTERESTS.—Dr. Syme says (and the remark applies to dentists as well as to doctors): "There are three ways you may try; there are three interests you have to consider, and it will depend upon the order in which you consider them how success will be measured out to you. The first interest is your own, and it may seem to you the greatest, while it is really the last. The second interest is truly greater, for it is the interest of your professional brothers; but the last is the greatest of all, for it is the interest of your patient, and with that is eternally related the interest of the art you practice."—*Medical Record*.

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## HINTS AND QUERIES.

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A SOUTH LIGHT.—How can it be best regulated in the operating-room of the dental office?—JAMES W. CORMANY, Mt. Carroll, Ill.

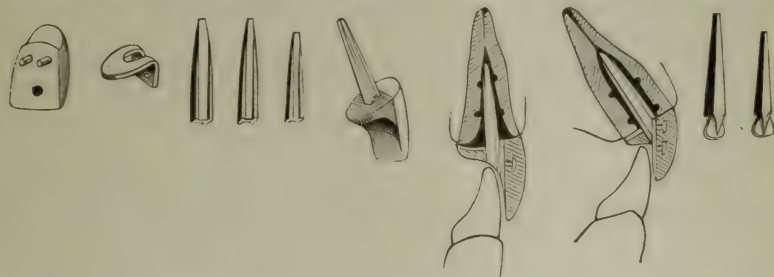
SINGLE-TOOTH DENTURE.—Will some reader of the DENTAL COSMOS have the kindness to describe the best method of constructing a fixed or removable substitute for a lost first right superior bicuspid; the second bicuspid having a large anterior approximal gold filling? The other teeth are in perfect order and of good length. It is desired that the proposed denture shall occupy as small space as is compatible with its firm retention without injury of the adjoining teeth.—R.

IN reply to Dr. F. F. Gage, Boston, in the December number of the DENTAL COSMOS, upon "Dry Mouth," I will say that a metal plate of any kind will afford the needed relief.—L. P. HASKELL.

THE LOGAN TOOTH-CROWN POST is an excellent feature of that superior crown, which is well designed for general use, but not infrequently we have cases where the occlusion is such that only thin plate teeth can be used, and in these instances I have wished that we might obtain the separate Logan posts for soldering to the backs of plate teeth. Modifying somewhat a European plan, I should take a thin plate tooth, Fig. 1; punch, fit, bend, and drill a piece of thin platinum plate, Fig. 2; cut a Logan post, as in Fig. 3, so that it will go through the hole drilled in the bent backing and stand in central relations to the plate tooth and its backing. The root having been properly prepared, the backing is riveted to the tooth; the thin platinum floor of the backing burnished and trimmed to fit the end of the root; the post put through the floor, and with hard wax or shellac cemented to the floor and backing. The piece is then put in place, and the wax or shellac softened with a hot instrument, while adjustment is carefully made with reference to proper occlusion. The piece is then removed, invested in plaster and marble-dust (or sand), soldered, and finished as in Fig. 4. The root is then made quite dry with bibulous paper, alcohol, and hot air; a suitable cement or amalgam packed quickly into the root, and the crown driven firmly home. All these steps having been judiciously and thoroughly accomplished, the mounted tooth-crown

would appear in section and also in relation to the occluding tooth as shown by Fig. 5. An example of the adaptation of this method to a case in which the all-porcelain crown would be practically inadmissible is given in Fig. 6. For such

FIG. 1. FIG. 2. FIG. 3. FIG. 4. FIG. 5. FIG. 6. FIG. 7.



cases one can more readily obtain a suitable plate tooth than a crown of any kind. May not the Logan post, Fig. 3, and also that of Dr. Parmly Brown, Fig. 7, be placed on sale at the depots?—E. C. K.

**INSTRUMENT FOR ENLARGING THE HOLES IN ARTIFICIAL TEETH.**—I frequently find it convenient to alter the shape of the holes in pivot and other porcelain teeth. At first I used a piece of copper wire with emery-powder, getting the idea from the glass-cutters. Now, however, I find that the time required can be reduced to one-third by using a piece of hardened steel of an oval, square, or half-round shape (see illustration), made to revolve rapidly in one of the S. S. White office lathes, and kept covered with coarse corundum moistened with glycerin. To show how rapidly this will cut, it is only necessary to say that a common Bonwill crown can have the hole enlarged enough to admit of two pins as for a bicuspid in ten minutes.—W. H. ROLLINS.



IN regard to the cracking of blocks or gum sections, in packing and pressing up preparatory to vulcanizing, I think that in nearly every case it can be accounted for by haste, too much rubber, and want of care. I put in just *enough* rubber,—therefore *need* no “gates”; put in but a little at a time; take apart several times in order to see that it is just full; use the thin muslin that comes between the rubber sheets to keep the model and rubber from sticking. Powdered soap-stone (French chalk) or a thick lather of white castile soap, brushed over and into the model with a little bristle-brush, will answer. I use the very finest plaster for the model, taking care to produce a very smooth one, and often do not need any of the above materials to prevent sticking. Should the muslin adhere to the rubber,—as it will sometimes if used when the starch is out of it,—by dabbing it with a bristle-brush and hot water, at the same time pulling on it, it easily comes off. Care should be taken to wash the rubber in the flask, when soap, soap-stone powder, or muslin containing starch has been used, before adding more to it, or the rubber will not unite.

As to teeth being cracked by putting flasks into hot water, I cannot think so, as I have done this for more than twenty years, and in that time do not think I have had more than five instances of breakage occur. Neither do I have broken or crushed models, flasks or presses, or teeth displaced. I can bring the two parts of the flask together easily with one hand on the screw, using no wrench.



A year or so ago some dentist, in "Hints and Queries," accounted for the frequent cracking of blocks by putting the flask in boiling water in pressing up. His wife, on seeing him place a flask in hot water, said that it was not strange the teeth should crack; that she should expect her dishes would crack were she to put boiling water to them. Porcelain will not crack by a change in temperature no greater than from the heat of an ordinary room to that of boiling water, but glass often will.

I think it all depends on care, for I "next to never" have a cracked block, crushed model, broken press or flask, as I always use brass flasks, and by my method they are sure to come together easily and safely, making a nice articulation.—A. A. HAZELTINE, New Bedford, Mass.

HERBST'S ANESTHETIC.—In the October number of the DENTAL COSMOS, page 610, mention is made of an "obtunding agent which consists of chemically-pure sulphuric acid saturated with hydrochlorate of cocaine; stir till the cocaine is well dissolved; then to this solution add sulphuric ether to a point of supersaturation, stirring well with a glass rod." This originated with and is advocated by Dr. Herbst.

In my own practice I found that the action of this compound was too violent, and I wiped the cavity dry and applied antacids at once. In a number of trials I each time found its action too violent, and did not get any reduction of the sensitiveness. A dilute solution of the acid was tried and no result was shown.

I have since learned that cocaine is a drug extremely sensitive to all chemical agents, both acids and alkalies, and that cocaine, when heated with hydrochloric acid, is broken up into methyl alcohol, benzoic acid, and a basic substance of an alkaloidal nature called eegonine. It would seem that if so sensitive a drug came in contact with sulphuric acid, chemically pure, it would be disintegrated and broken up. In the case of the dilute acid being used, a sulphate of cocaine would probably be formed, and but little benefit derived from the change.

Now, as to the supersaturation of the compound with ether, cocaine itself is soluble in ether, but all of the salts are insoluble; and this fact, I believe, is taken advantage of in the manufacture. I cannot see what benefit would be derived from such "supersaturation,"—a very unsatisfactory and meaningless term.

This has been written only with a desire to gain information as to the nature of the compound produced by such an action, and not in any way to attempt to correct Dr. Herbst in his method. One man may be sure of a truth, but before all men can accept it as truth from his *ipse dixit* some men must oppose it.—W. S. SULLIVAN, D.D.S., Madison, Wis.

THE TEETH AND THE HAIR.—Considering the common dermic origin of teeth and hair, would it not be well to observe and note their structural relations in the human subject? The hair of the head and face will of course claim principal attention in this connection, and as a dentist I have had occasion recently to notice several instances in which a superabundance of hair was associated with frail teeth, or the loss of teeth. One remarkable case was that of a boy, fifteen years of age, who had a plentiful head of hair, a full beard three inches in length, and not one sound tooth. I am aware that men frequently wear the moustache or a full beard to conceal the absence of teeth, but my thought is that between the teeth and the hair there is an interdependence of relationship which may be made manifest through general and recorded observations by dentists.—JOHN BAILY, Nashville, Tenn.

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No. 3.

ORIGINAL COMMUNICATIONS.

THE UNKNOWN FACTOR.

BY G. S. DEAN, SAN FRANCISCO, CAL.

IN a polemical discussion prolonged silence indicates defeat; the ammunition of the silent party is exhausted. And now that the theologico-scientific controversy concerning the determination of dental structure by function has terminated, as usual, in the victory of argument over vituperation, it may not be amiss to endeavor to widen our field of view by pointing out the fact that the theologians have not been *wholly* wrong in their opposition to the functionists,—that, though structure is largely determined by function, it is not wholly so determined. In other words, there is an unknown factor.

I am not here alluding to the truth which the functionists themselves admit—that structure is inherited. I am well aware that heredity plays quite as important a part as adaptation in the function theory. Nor am I alluding (except incidentally) to the Darwinian truth of variation resulting from pre-natal influences to us unknown, and “natural selection” of the “fittest” among the varying individuals.

I allude to a broader truth, which includes the Darwinian or embryological variation as a special phase—the truth that, apart from function, there is an unknown cause of structure.

It is certainly true that function modifies structure—that the used limb develops, and the unused dwindles. It is no less true that the Pacific Islander, who lives on a sort of pap called “poi,” has splendid teeth; and instances like this last might be greatly multiplied. The Chinaman, who lives on boiled rice, has become a familiar figure in some of our cities; and we never hear him adduced as an illustration of the degrading effect of insufficient function on dental structure. We are somewhat familiar with the Italian, who lives on macaroni, and whose dense teeth, when they happen to come under our care

are peculiarly destructive to our burs, and are set in a jaw of such solidity that, when they need extraction, they often resist the forceps and must be dissected out. The "simple swain" of Scotland has been presented in our text-books and journals as an example for our emulation—his teeth being of "the best"; yet his staple food is what he calls "porridge," and what we should call "mush" or "gruel"—a substance which certainly does not require excessive mastication. Among ourselves there are multitudes whose solid teeth are seldom or never presented to the dentist's eye; yet these persons live like all the rest of us. Finally, it may not be amiss to express a little skepticism as to the "hard work" done by "uncivilized teeth" in general. Man is "a cooking animal"; the uncivilized, no less than the civilized, employs fire to lighten the labor of his masticatory apparatus.

That function certainly modifies structure, the "horny-handed son of toil" may serve as an instance. Perhaps function may go further—may produce the horny jaw, as well as the horny hand; and may, aided by natural selection operating through countless generations, develop that partial dermal skeleton called the denture. But how about the turtle? Did this fellow toil all over, and so become incrustated with a shell? It is certain that toil causes bones to indurate; but it certainly is not toil which causes induration of the skull. The heart-valves toil incessantly, yet they seldom indurate; and when they do no one refers their calcification to the function cause, and if he did he could be met by reference to occasionally calcifying membranes which have little exercise; to the ganglion-cells of the brain-cortex, to tumors, and above all to the extra-uterine fetus, which sometimes calcifies, but which does not toil at all.

It may be objected that some of these illustrations are taken from the pathological. But to this objection the simple reply would be, a request that the objector should draw the line which separates the pathological from the physiological. Is the frail tooth pathological? And, if not, where shall we draw the line between the frail child and the rachitic? Is great genius pathological? Or the patching out of the skull with Wormian bones? Is the calcification of a tumor pathological? If so, then the pathological is a means to what we call health. In brief, a "theory" or "divine view" must embrace the whole field. It must give an account of the "morbid" as well as of the "normal." And the function theory, leaving unexplained a vast mass of "physiological" facts, becomes hopelessly weak when required to face the "pathological."

These phenomena have causes; and, admitting the validity of the function-cause, appreciating its discussion as a contribution to our



knowledge, it is to be added that, though this is the truth, it is not the whole truth. Partial truth is misleading,—a fact well exemplified in the present discussion.

The distillery cow has been repeatedly adduced as a "terrible warning,"—as a clear presentation of the deleterious effect of diminished function on dental structure. She has become a sort of stock argument with the functionists; seems to be regarded as the cap of the climax, the final and complete demonstration. We are told that her teeth become carious and her gums diseased; because, living on "mash" ("mush"), her teeth and jaws have no work to do. Let us examine this distillery cow, and see if she does really teach the function-lesson. The typical animal, with carious and loosened teeth, must be somewhat rare; for I have never seen her nor met any one who has seen her, though I live in a region where there are multitudes of cows fed on "mash" from breweries and distilleries. Moreover, in man the carious tooth rarely loosens, and the loose tooth rarely decays. And again, in regions where there is no mash it is common to cook the food of cows,—yet we hear of no dental diseases; while, on the other hand, the horse, whose oats are never cooked, requires dentistry.

But, admitting the existence of the typical "distillery cow," does she really teach us that caries and loosening of the teeth result from the cooking or softening of food? With regard to caries, the answer is plain. Diminished function may result in atrophy, either qualitative or quantitative,—degradation of structure in quality or in size (and number). But alone it cannot produce that eating away of the structure from without which we call caries. Every dentist has seen pearly dentures, of the frailest character, wholly free from decay. With regard to the loosening of the teeth,—alveolar atrophy,—the functionist can make out a better *a priori* case. Here we have cessation of use, and following this we find loss of structure. The link of cause and effect seems clear. But there comes into view the senile atrophy of man, whereby his nose becomes "a world too wide for his shrunk shank," and which leaves him "sans eyes, sans teeth, sans everything." And, weightier than all, there appears the scorbutic patient. Does this man, too, suffer from lack of dental function?

What are the facts with regard to the "distillery cow"? I must draw them from the reports of those who have seen her. According to these reports, she suffers from a scorbutic disease; such, at least, is my diagnosis of her case. Here are the reported symptoms: "A dull, lack-luster eye; bare patches of skin, where the hair has fallen off; water-bunches around the throat and over the eyes; horrid sores on the udders; the teeth drop out; the animal wastes to a skeleton." Certainly, a disease which combines these symptoms

differs less from *purpura nautica* than the various forms of *purpura* differ from one another; and it is rational to expect that animals deprived of all food except grain from which the soluble salts have been extracted will pass into a condition like that into which man passes under similar circumstances. If this diagnosis is correct, the bovine dental disease is to be cured, not by giving "toil" to the teeth, but by adding to the so-called "swill" on which the animal feeds a due amount of actual swill,—potato-peelings and vegetable refuse generally.

What is here said of the "distillery cow" might, with certain modifications, be said of other instances adduced to show the omnipotence of function. Two long chapters might be written,—one on the effect of depriving animals and plants of various substances; the other on the effect of "slow poisons" on the system. To which might be added (if the incompetence of the function theory were not already amply manifest) a presentation of a truth the direct reverse of that maintained by the functionists,—namely, degradation resulting from exercise; the dwarfing or stunting of the overworked child; the "failure in life" of the "infant prodigy," the valedictorian or "best scholar"; atrophy of the brain as the result of mental overwork; progressive muscular atrophy as the result of severe exertion; and, most singular to us whose social mutilations take less destructive forms, atrophy of the testicles, purposely brought upon themselves by certain Indians as a mark of political distinction, and produced by sexual excesses.

In result it appears that, while the functionists have told us the truth, they have not told us the *whole* truth. Function can account for the digging apparatus of the mole; and can even, to a limited extent, explain the fact that, in different species of mole, this apparatus is carried forward to its singularly effective position by the modification of different bones. It can explain the rudimentary limbs found in the body of the whale and the rudimentary caudal appendage of man, and it fully meets the case of intestinal atrophy as a sequel of artificial anus.

But function does not fully cover the ground when applied, as it has been in this discussion, to the humming-bird's beak. It is not function which paints the plumage of the bobolink; which rounds out the limbs of man and the face of woman; which gives the "almond eye" to the Chinaman, and produces the bulging of exophthalmic goitre; which underlies the square shoulders of the Englishman and the sloping shoulders of the Yankee, the aquiline nose of the red Indian and the flat nose of the negro, the straight scalp-lock of the one and the curling wool of the other; the low stature, brown skin, dark eye of the Eskimo, and the tall stature, fair com-

plexion, blue eye of the Teutonic races. Nor does it plainly appear, from the evidence adduced, that function can give an adequate account of the square, dense, yellow teeth of the pachydermatous man; or of the long, delicate, blue teeth of his thin-skinned antithesis.

If it be still insisted that the early loss of American teeth is due to lack of function; that we are becoming edentulous because our teeth lack work, will the functionist kindly take one further step? Will he be so good as to inform us in what respect our hair lacks work?—for it is certain that we are early becoming bald.

It is difficult to know where to stop. There is no marked difference in the function of Attic and Bœotian. Yet the ancient Attic was light and active, the ancient Bœotian heavy and phlegmatic, though both were Greek; and the modern Attic is light and active, the modern Bœotian heavy and phlegmatic, though both are Albanian. From time immemorial, some districts of Switzerland have been goitrous, others the reverse. Not only will no one have the hardihood to assert that goitre is due to "toil"; but, as yet, an enlarged thyroid has not become hereditary, as the function theory would require. Gout is common in England and rare in America, the function of European and American being substantially the same. But why go on? Facts well up in such numbers that it is impossible to transfer them to paper; they will suggest themselves in droves to any one who will give the subject a moment's reflection. For, while the functionist is beating the woods in search of evidence, the commonest phenomena—the tail of the cat, the different kinds of hair on different varieties of dog, the dyspepsia which afflicts the American nation—are left unexplained. But surely enough has been said to show that we must accept the statement, that the teeth have arisen from nothing in response to function (which is only a narrower form of the statement that man has arisen from nothing in response to function), not only *cum grano salis*, but *cum MAGNO grano*.

Nine-tenths of the practice of medicine rests on the belief that the organism is modified otherwise than by function. Under this belief, colchicum is given in gout, iodine in goitre, vegetable salts and acids in scurvy. I cheerfully admit that the doctor has always had too much confidence in his "doctoring." I hail with delight the appearance in medical journals of skeptical articles with titles such as "What can we Cure?"—believing that this skepticism is the necessary prelude to a rational system of practice, founded on critical or systematic experiment, and guided by common sense. But there is the fullest evidence that medicine—mercury, iron, arsenic, and so on indefinitely—*does* modify the system; in other words, that the organism is modified by other agencies as well as by function; and



even that these other agencies are more powerful than function itself.

Function does, as one of the learned contestants has observed, give a partial explanation of the milk in the mamma. I say "a partial explanation," for, though in this discussion it seems to be assumed that, if the *excitant* is found, no more remains to be done, I cannot regard an explanation as finished unless it accomplishes the more difficult task of unearthing the *predisponent*. And this truth, that there is a predisponent, it is the distinctive merit of the theologians to have upheld.

Whether the ultimate predisponent (or, more accurately, the ultimate source of both predisponent and excitant) be or be not a divine fiat, is irrelevant to the purpose of this paper. So long as our minds are what they now are, we cannot extend our investigations to the ultimate. We may humbly believe, but we cannot scientifically demonstrate. If we could search out First Cause, if we could penetrate the ultimate mystery of the universe, it would be no part of my present purpose to do this. I am here discussing only direct or immediate causation; and even this only negatively. I am setting up no claim to knowledge. I am simply pointing out, as a mere critic, that the functionists have not made out their case,—that, ignoring predisposing cause entirely, they have given only a partial account of exciting cause itself.

I merely assert that the function theory does not cover the ground; that, without referring at all to the ultimate, it gives us only a partial view of the proximate. It is entirely valid as far as it goes, but it does not go far enough. It is very valuable, if accepted as what it is—a partial truth; but, like all partial truth, it is "a whole lie" if accepted as a complete statement of the case. While it gives a limited explanation of some phenomena, it conspicuously fails to explain all which is to be explained. Or, to come down from the sublime to the ridiculous, and express the matter in a single sentence couched in the phraseology of the late Artemus Ward, the function theory fails to solve the "puzzle to the philosopher;" while it partially accounts for the milk in the mamma, it wholly fails to "account for the milk in the cocoanut."

Here, then, is the general truth which we have to recognize,—not that function is powerless to affect structure, but that formation of structure by function is only a part of the case. There is another factor in the determination of structure, acting not only through parents on unborn children, but continuing to act through life—a factor extremely complex in nature, concerning which we have acquired, since the birth of chemistry, some items of exoteric information; but which, in its esoteric mystery, is so far beyond us, em-

braces so many of the "more things in heaven and earth than are dreamt of in our philosophy," that we may properly call it the Unknown Factor.

## SCIENCE AND DENTISTRY: A MONOGRAPH.

BY T. D. SHUMWAY, BOSTON, MASS.

(Read before the First District Dental Society of the State of New York, at its Eighteenth Anniversary, January 17, 1887.

"The conservation of force,—the highest law in physical science which our faculties permit us to perceive."

FOR a considerable period, extending over a series of years, my mind has been exercised to determine the higher law in physics which should place the practice of dentistry upon a scientific basis. It early became apparent that, without some well-defined reasons for the cause of decay in teeth, the means employed to arrest and prevent it would be but partially successful, and this only by accident or chance. With this object in view, it has been my purpose, so far as opportunity would permit, to examine with care the discussions that have appeared, and the arguments advanced, from time to time, relating to this subject, important alike to the dentist and the patient. Added to this, also, is the result of personal observation and reflection. From all that can be learned, I am compelled to recognize the conclusion that our faculties are only permitted to perceive, not to know, the highest law in physical science. That dentistry is allied to science admits of no question; that it can never rest upon absolute knowledge is also plain. There are recognized principles, but no mathematical certainties: the rule of mechanics will not apply.

The teeth in their growth and decay are subject to the highest law which we can perceive, as are all the other parts of the human organism. Dental operations cannot be based upon an exact science any more than a medical dose. "My remedy conquers pain," says the advertising quack, but it never did, nor ever can, cure disease. Until science can tell how the heart is set in motion, and what causes it to continue to beat, there can be no absolute knowledge of the cause of decay and dissolution. Huxley said he saw forces which might account for the sap and growth of trees, but he asks the question, "Does this account for my heart-beat?" And his reply was, "On this I do not venture an opinion." When this question is answered the problem of life will be solved, and demonstrated truth will take the place of the dentist as well as of the doctor. But this by no means detracts from the necessity of dental operations, or lessens the importance of a method of practice based upon the best knowledge it is possible to obtain.

As dentistry, when applied, embraces about all the sciences, this knowledge should be the result of information gathered from whatever sources are presented. The object of this paper is to point out some of the errors and mistakes which have resulted from false theories regarding decay, and the unscientific nature of the so-called scientific methods employed to arrest it; and, in the second place, to call attention to certain fundamental principles which must be obeyed if dentistry is to have a place above that of mere mechanics. Most dental operations are performed upon the teeth with the theory in the mind of the operator that the primary cause of the disease is external. If we see a house that is weather-beaten and black, we say it needs a coat of paint. Why is this? Because air and moisture and heat have produced certain results which tend to disintegrate and destroy the integrity of the building. The dentist observes a similar phenomenon in the teeth, and immediately concludes it must be from the same cause. Investigation begins with this notion already fixed in the mind, and whatever facts are revealed must be made to conform with this preconceived idea. To confirm the truth of this statement, we have only to call attention to the recognized method of practice, and to the rules given to patients regarding the care of the teeth. The devices for making fillings hard, the "knuckling" process, and the permanent separation, are considered the only ways to prevent a recurrence of the disease. These are some of the rules given to patients if they would save the teeth: Candies and other sweets must not be given to children,—this, too, at the age when the system most craves and demands sugar; the use of floss-silk between the teeth to remove foreign matter, which, if allowed to remain, will produce ferment, which results in a destructive acid; a wash, to correct vitiated secretions, and then corrosive sublimate, or some other powerful agent, known to destroy animal life, to be used in the mouth to kill the germ, which is said to be active and determined in the work of destruction.

But in spite of the laborious efforts on the part of the dentist, and the most watchful care of the patient, the disease goes on. Then comes the theory that the advance in civilization and the introduction of improved methods in living are potent factors in decay; and as a consequence the coming man must be edentulous. Some well-known scientific writer has said that "much harm has been done by attempting to dissect matter, and to discuss the size, shape, and number of atoms." The reason for this statement is obvious. In discussing the size, shape, and number of atoms the investigator is attempting to deal with matter in the concrete, and abstract or fundamental principles are entirely ignored. The result



of such investigation can be only partially complete, for the reason that it is effect rather than cause that is made the subject of study. I believe that much harm has been done by an attempt to base dental operations upon microscopic observation, or upon the result of experiments in a chemical laboratory. If you inquire of the microscopist why teeth decay, he will answer that it is the work of a microbe. If you ask the same question of one who has made chemistry a study, his reply will be that it is the effect of an acid. I would not fail to recognize the full value of the work done by those who have labored so faithfully and earnestly either with the microscope or by chemical analysis; but it is plain to those who have followed these investigations that they have led to directly opposite conclusions. Finally, after spending a great deal of energy to maintain theories so antagonistic, each side has been forced to admit that both conditions exist at the same time. That bacteria or some other infinitesimal parasite is present in dental caries, appears to be well established; and in the same condition acids are easily detected. The question is at last narrowed to about this, Which of these is first to appear? Does the acid generate the "bug," or does the "bug" make a place for the acid? Now, this is the inevitable result when conditions are made the special subject of inquiry.

The cause remains hidden, and still calls for the highest intellectual perception. The demand is for a broader basis of investigation. If we would know the reasons for an abnormal condition, we must first study the causes that result in health. Physiological must always precede pathological conditions. To know the laws that govern health, we must learn the process by which nature acts. If this, as yet, is only given us to perceive, not to know, how important it is that we seek information from every source, rather than confine investigation within the narrow limits of a vision liable to mistake!

It must be a recognized principle in dental science, as in all departments of knowledge, that the whole is greater than one of its parts. The standard must be one of health, not disease. How could we know that a gnarl on a tree is not a healthy condition except by comparing it with the vigorous and sturdy oak? Disease of any kind is the correlative of health, just as in the moral world wrong is simply the right twisted or wrung. If the gnarl on the oak is an abnormal condition, the result of an internal derangement, just as a moral action is either good or bad according to the condition of mind which is the impelling force, it follows that a disease affecting any of the organs of the human body must have its origin in precisely the same way. If these observations are correct, the

primary cause of decay in teeth must be sought after from within, and not from without. External decay is merely incidental, and furnishes no groundwork on which to base a method of practice. The question of special interest to the dentist is that of tooth life, not tooth death. He is to learn of the forces set in motion to produce this wonderful piece of mechanism. The microscope and chemical analysis are only auxiliaries, not the end, of investigation. In the study of the anatomy of tooth-substance, we find that dentine is made up of tubuli filled with minute fibers, which reveal a molecular structure, while in the enamel there is an aggregation of matter in the crystalline form. Now, the process of nature in the formation of the enamel, and the growth of the dentine, is as distinct and different as that which makes a marble quarry or constructs a tree. In the formation of enamel there is developed an inorganic substance wholly devoid of animal life, with no power to reproduce itself. Whatever trace of organic matter is found in the enamel must be where it joins the dentine, and serves the same purpose as the cementum which covers the external root. In the perfect enamel covering, or Nasmyth's membrane, there can be no organic life. In the dentine there is developed a living structure, filled with organic matter, which is constantly nourished and built up, to furnish protection and support. The growth of the dentine is the same as the growth of a tree inverted.

In the development of the teeth there are set in motion certain forces to build up or make a complete whole,—one by a process of aggregation, the other by molecular power. In the one case crystals are made; in the other fiber is grown. These forces cannot be identical, because the results are entirely different. At the same time, they must be forces that are reciprocal, inseparable, and mutually dependent. This is the correlation of force, the highest law, which our faculties permit us only to perceive. The enamel of a tooth is made of prismatic crystals, and its external covering is as indestructible as the polished surface of the hardest granite. In fact, it is less liable to be affected by outside influences than almost any substance known in the inorganic world. Among the remains of pre-historic animals, the enamel of the teeth is the only part that does not show the disintegrating effects of time. The remains of a mastodon recently exhumed near Worcester revealed a perfect enamel structure, while the rest of the bones crumbled at the slightest touch. The dentine being fibrous or molecular, is affected by the same causes that destroy other organic bodies. For a better understanding of these differing but reciprocal forces, it is well to study the process by which a tooth is builded. In the first place, all that there is of the future perfect organ is contained

within a follicle, or sac. At the extreme point, which is to be the cusp, or cutting edge, there first appears a calcareous deposit. Immediately outside of this there begins a marvelous process of crystallization, and from within outward the work progresses until the enamel is completely formed. The formation of the dentine begins outwardly and is carried on within. Gradually the soft tissue recedes, and its place is filled with a calcified body made up of fibers corresponding in structure to the woody fiber which makes the substance of trees and plants. This body is nourished with a fluid which performs the same service for the tooth that the sap does for the tree, and on which it depends for sustenance and support. The method by which the atoms arrange themselves into crystals to form the enamel could not by any possibility take place except from within outward. Those who have watched the process know with what energy and expansive force the particles assume new position in crystallization. To form enamel from without inward would be like filling a barrel with water and then freezing it. There is, in all the atoms of which bodies are made, a tendency to run into symmetric forms. In the process of crystallization to form enamel there is always this tendency to assume the same definite arrangement. This arrangement, if not obstructed, will produce an indestructible covering that will withstand the action of any agent with which it may come in contact in the place it was designed to occupy. The tendency of the atoms of which bodies are made to assume definite shapes is in obedience to a universal law. While in the operation of this law there is variety, yet the result is unity. This law is made manifest in the unceasing struggle of animals and plants to return to the original type. As some one has aptly said, "it is the partial reconciling itself to the universal." In the formation of the enamel covering, differing as it does from the process by which the dentine is made, we can discern a fulfillment of this law. We see forces in opposition, but yet reciprocal and mutually dependent. It is a law of correspondence. This correspondence is as necessary in the development of the enamel structure as is the formation of the bark of a tree to the flower or fruit with which its boughs are laden. To say that a disease which may affect the tree is the work of a parasite, or the result of chemical decomposition, is not dealing with cause, but condition. The difficulty with the tree, if it is attacked with disease, is that the law of correspondence has been broken. The particles which go to make the unit did not run into symmetric forms. External appearance only indicates an internal derangement. This same law applies in the development of a tooth. If there is an abnormal condition, it is for a want of correspondence.



Had there been a correlation of force, there would have been no lesion. Without a lesion caries could not take place, because the outside covering would furnish an absolute protection. A want of correspondence, or of force in apposition, may then be regarded as the first cause of dental lesion.

The terms "chemico-vital action" and "nervous force" have application only as they recognize this higher law. Violation of this law produces the condition which makes possible the action of air and moisture, the elements necessary for chemical decomposition. That lesions do not always result in decay, is because the internal recuperative energy is sufficient to maintain an equilibrium. An examination of a tooth with the rubber dam, as soon as it is erupted, will disclose the enamel lesion, and the place where caries is liable to take place. The number of instances where this will not prove true are so few as only to confirm the rule. Invariably the teeth decay in pairs. A dentist is seldom called upon to fill a tooth that he does not find the corresponding one in a diseased condition. These teeth were developed at the same time, and the cause which produced the lesion in one may be looked for in the other. It is true, the extent of the lesion may not be as great, but this only confirms the opinion that the cause was from within and not from without. Suppose we assume this abnormal condition to be the work of a parasite, then it would appear that they are endowed with sufficient intellectual discernment to make use of method in their plan of attack. Or if, as it is urged, this effect is the result of an acid secretion, why are not all the teeth involved at the same time by this corroding agent? Caries almost invariably appears first in the central incisors, or the grinding surface of the sixth-year molars, where the action of acids would be the least potent. To my mind, it is much more reasonable to believe that the formation of the teeth is the result of two distinct and definite forces, but which are inseparable and mutually dependent; and the disease to which they are liable is from a want of correspondence during the period of development. If this be the real cause of dental lesion, and external decay is only appearance or phenomenon, a recognition of this higher law, the conservation of force, becomes imperative if the dentist would cope successfully with the disease.

The method employed in tooth-stopping must, from its nature, be mechanical; but to be scientific, there must be a perception of the action of crystalline and molecular force, as a condition of health. Tooth-stopping cannot be said to be remedial, but it should not be obstructive. As the basic principle of life can only be perceived, not understood, the dentist in his operations must from necessity deal with effects rather than first cause. There are general rules relating

to health to which the dentist may call attention, but the practice of these rules he must leave to the knowledge and understanding, as well as the inclination, of the patient. Certain notions have obtained in regard to the use of coarse foods, which it is claimed have more of the bone-making material. (It is surprising how notions prevail for a time with only a slight scientific basis.) The conservation of force depends upon a generous, wholesome, nutritious diet, rather than the strict adherence to a set formula like that regarding oatmeal, which is made palatable only by disguising it with a large supply of sugar and cream.

If the basic principle of life, the highest law which governs growth and decay, can only be perceived, not known, it does not imply that there may not be a method of practice based upon scientific knowledge. On the contrary, a recognition of this law reveals the kind of treatment the teeth should receive. The dentine being molecular or fibrous in its structure, demands a material which, when placed against the dentinal walls, will not interfere with or obstruct the process of restoration going on within. This, first of all, calls for scientific knowledge in the choice of tooth-filling material, which can only be obtained by a study of the law of correspondence. Those who have advanced the electro-chemical theory of decay call this compatibility. The claims of those who advocate this theory have not received that recognition which its importance demands. The experiments made, no doubt, disclosed what the experimenters claimed,—*i. e.*, “an electrical affinity of gold for dentos.” The experiments of Plucker and others long since determined that crystalline bodies are definitely affected by magnetism. The reason why gutta-percha will arrest decay is because, it being amorphous, it does not interfere with the action of forces that are reciprocal and mutually dependent, and on which the restoration of the tooth to health depends. Tin as a tooth-stopping does not derive its value from any preservative or antiseptic properties, but only because of the difficulty with which it can be made to assume the crystalline form. It is for this reason that its value cannot be impaired by manipulation. As there are objections to the use of either of these materials for permanent tooth-filling, they must remain of secondary importance to the dentist. In the experiments which are to be made in the future, to find a tooth-stopping which will meet the requirements of durability and ease of manipulation, to be successful, the law of correspondence must be recognized. As this seems about as remote as the finding of the philosopher’s stone, the profession must make use of such materials as are at hand. Gold will probably remain the most important tooth-stopping for a considerable time. Among all the products of nature, I know of none more wonderful in its con-

struction than this metal, or none of more special interest to those whose calling it is to engage in filling teeth. The evidence is not wanting to show the regard the profession has generally for gold as a tooth-stopping material. The skill employed in manipulation determines, in no small degree, professional standing. The introduction of new forms of gold, and of improved as well as new appliances in using it, awakens the keenest interest. Among all the subjects brought to the attention of the dental societies, gold and how to use it has been the one to provoke the most discussion. The popular prejudice is so strongly in its favor, that there are few who are able to pay for it who do not prefer this metal to any of the baser materials. With this demand upon the dentist, a scientific knowledge of the nature and properties of gold, so as to determine where, when, and how to use it, becomes imperative. The conservation of force, the highest law in physical science, is the only rational basis on which to formulate a method of practice. The opinion which recently obtained, that gold is the most dangerous material to use if the teeth are to be saved, I am persuaded would never have found expression had there been a better appreciation of the correlation of force. There are dentists now living who have used gold in filling teeth for upwards of half a century, who never saw anything dangerous in it. On the contrary, they found it the only reliable, permanent tooth-stopping. What is the reason for these opinions, so directly opposed to each other? Is it to be found in this, that in using gold the one recognized and obeyed the law of correspondence and the other did not? Gold is crystalline in its formation, but when beaten out into thin sheets, or foil, the crystals are broken and laminated, and its physical properties are completely changed. When used in this form against the walls of the dentine, it fulfills the highest law, and the process of restoration going on within is not obstructed.

As the tendency of all the atoms of which bodies are made is always to assume the same definite shape, if heat be applied to the foil the crystals are liberated, and if percussion is then added the result is a pure crystallization. The action of heat and force is well understood when applied to other metals. The axles of car-wheels are molecular or fibrous when first constructed, but by use, with the immense weight they are made to carry, they become crystalline. Now, a crystalline body is as unsuited to come in contact with the walls of the dentine as would be a cobble-stone in the hole which a woodpecker had made in a tree. Gold possesses the property of uniting with itself, forming one solid or compact body. This union of the particles takes place at an insensible distance, like the uniting of two drops of water, and is said to be in obedience to the law of



cohesive attraction. The aggregation of homogeneous particles is not advanced by percussion. Pounding gold into the teeth with a mallet does not add to the cohesive property of the material. It will make a beautiful piece of work when viewed simply from the mechanical stand-point, but, by changing the physical properties of the gold, it is not only dangerous, but positively injurious. It is opposed by the operation of crystalline and molecular forces, on which the health of the teeth depends. That some teeth escape injury from pounding, is due to the strong, dense character of the dentine, as the result of a conservation of force. As crystalline bodies are definitely affected by magnetism, the experiments of Palmer and Chase, which established the electrical affinity of gold for tooth-substance, show how unscientific it is to add to crystallization by the use of the mallet. I would not be understood as condemning the use of cohesive gold. On the contrary, I recognize its exceeding value and importance. Its laminated crystalline surface peculiarly adapts it to supply the place of the enamel, to protect the molecular or fibrous structure of the dentine. This meets the law of correspondence the same as does the outer skin of the body, or the bark of a tree. To maintain a scientific method in filling teeth when the highest law in physics can only be perceived, not known, I am aware seems paradoxical. But consistency is not always to be found in the higher conception of the truth.

As part of the matter which this paper contains is somewhat original, it may partially account for the imperfect way in which it has been presented. I am conscious of its elementary character, but this was made so by necessity. That the theory advanced is open to objection, I am fully aware. If a theory had no objection it would become a law, and this, I recognized at the outset, can only be perceived, not known. The fair way to test any theory is to compare it with other theories, and see if, on the whole, the balance of probability is not in its favor.

A great deal has been said about the necessity of a better recognition of dentistry by the medical profession. I confess this matter has had very little interest for me. There is no occasion for fear lest the world will not, in the long run, estimate any commodity we may bring to market at its full value. The way for the dentist to get recognition is to prove himself worthy of it. I know of no better way to accomplish this object than for the whole profession to have a unity of purpose. One of the means to bring about this union, and to my mind a very important one, is to have a uniform method in filling teeth, based upon recognized principles in science. How much more effective would be our dental schools in fixing a standard for the profession, if the student could be instructed in a method of

practice based upon well-known scientific principles, rather than an eclecticism, such as is now too prevalent, in which the student simply pays his money and takes his choice! The operation which the dentist is called upon most frequently to perform should be made the easiest and simplest, instead of the hardest and most difficult. Filling teeth with gold should be a pleasant task to one who has voluntarily chosen it as a life-work. The reason why it is so difficult to master this material, I am convinced, is because the method of using it is opposed by natural law. If there is to be a scientific method in practice, a unity of purpose in the profession, and a higher standard for dentistry, it must have its basis in the conservation of force, the highest law in physical science.

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## CORRESPONDENCE.

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### A COMPROMISE, BUT NOT A RETREAT.

TO THE EDITOR OF THE DENTAL COSMOS:

THERE are two paragraphs in your editorial in the DENTAL COSMOS for February to which I take exception, and to which I wish to make a response.

1st. "Dr. N. W. Kingsley \* \* \* proceeded to say that he desired to recede from the position taken in the paper recently read entitled 'Dentistry not a Specialty in Medicine.'"

2d. "The project which has been discussed in several quarters for an International Dental Congress, *in lieu of a Dental Section in a Medical Congress,*" etc. (The italics are mine.)

I wish to reply to the second quotation first.

So far as I have any personal knowledge of or association with any gentlemen who have shown any interest in an International Dental Congress, it was never suggested nor even thought of to hold such a congress "in lieu of a Dental Section in a Medical Congress."

From the very first discussion of the matter it had not entered the minds of anyone that such a congress could be held before the summer or autumn of 1888 or 1889.

Nor could any of these gentlemen conceive how a Dental Congress in 1888 or 1889 could be construed into *hostility* to a section in a Medical Congress in 1887, which would have accomplished its work and been disbanded from one to two years before. The above quotation is a reflection upon the good sense and the *esprit de corps* of the gentlemen referred to.

The statement contained in the first quotation, both in what it says and what it does not say, is to me a more serious matter.

Previous to the preparation of my Boston address I had been at considerable pains to inform myself of the prevailing views of my profession upon the subject contained in its title, and I became fully satisfied that the views which I then gave voice to would be indorsed by a large majority of my colleagues.

I became also equally satisfied that there was a prevalent indifference to a Section in the Medical Congress,—not hostility, but apathy,—and that that indifference was justly based largely on the fact that as dentists or *practitioners of dentistry only* they could not enter the Medical Congress on an equality with medical men unless they had the medical degree; that if they were received at all it would be by toleration; and there are many men, and I am one of that number, who could not have gone into that section under the conditions that then existed without feeling the same humiliation that I did in London in 1881,\* when I was told that I, being a dentist only, had no rights in the congress beyond what were accorded as an act of courtesy.

Now, my belief in the tremendous fact that dentistry has grown to be practically a separate and independent profession is a belief from which I am not at all likely to be converted or “recede.”

But the question of our profession sustaining a “Section” in a Medical Congress is simply one of policy.

I was informed during the meetings of the First District Society that there had been a marked change of policy on the part of the managers of the Dental Section of the Medical Congress, and that they had removed all restrictions against the admission of any reputable dentist who might apply and pay the entrance fee, and that, instead of the Section being made up of M.D.’s, who had a right there, and those dentists who might be lucky enough to get a special invitation, the doors were now wide open, and the Section was no longer exclusive.

Such information, although not promulgated, was quite sufficient to win for the Section my influence and support, and with that feeling I made the remarks alluded to in the editorial, and which are herewith appended.

NORMAN W. KINGSLEY.

[STENOGRAPHER’S REPORT.]

I have recently gained some notoriety from an address I delivered in Boston. I do not say reputation, I say notoriety. (Laughter.) Sometimes a man writes wiser than he knows, and sometimes he writes more foolishly. It is not for him to decide, nor in the usual line of things is it for his contemporaries to decide, whether it was wiser or more foolish. What I have written I have written. It

\* “When I attended the International Medical Congress in London I felt disgraced.”—H. J. McKellops, in *Ohio State Journal*, April, 1885, page 175.



is not necessary for me to say to you that I was attempting to prove that dentistry was not a specialty in medicine. I believed then and I believe now every sentence I uttered on that subject. I am not now going to take up that argument. I simply wish to say that what I meant by that effort was, that while dentistry is certainly a branch of the healing art, dentistry in its practice the world over is distinctly a separate and independent profession from the practice of medicine as we understand it. I may have stated the matter correctly or incorrectly; it matters not now. As the result of my reflections upon that subject, I reached a conclusion which was clear and logical in my own mind. It seemed to me the only deduction from the arguments which I had made, and I believed those arguments sound. I had no other motive than that of dignifying the vocation to which I belong, and I believed I was dignifying it more by saying what I could for it as an independent profession than I could in any other way. I was sincere. But I find that in that address there is a single sentence\* or so that has attracted more attention than I had anticipated, and out of a single paragraph has grown the somewhat prevalent idea, I am sorry to say, that *my whole effort* was aimed in antagonism to the International Medical Congress which is to be held in this country this year in the month of September. In looking over the *menu* I find that our caterer here this evening has neglected to supply one course on his bill of fare which my palate misses. I doubt very much whether any of the rest of you have missed it, but I miss it and propose to supply it for myself.

Gentlemen, bitter as it may be under some circumstances in life for a man to eat his own words, that is the *course* that I now take. (Applause.) To eat my own words voluntarily is not bitter, and to-night I relish the morsel. There is to be an International Medical Congress, and there is to be a Section of Dental and Oral Surgery in that Congress; and the gentlemen who form the management of that Congress, and who belong to the medical profession, have invited us as dentists to be their guests. Who this night are the most honored individuals at this table, the members of the First District Society, who pay for their right to be here, or the guests who are invited? To whom is the honor due; who receive the honor, the invited guests or the members of the society, who by right belong here and extend to the others the invitation? If the medical profession in congress assembled extend *an invitation to us as dentists to join with them in that congress*, the only question that comes before us is this, Will our beloved profession, which we love above all other professions, be benefited or injured by joining that congress? I say to you, gentlemen, that I doubt whether there is a single individual in this assemblage or throughout the whole land who can say that he believes that dentistry as a profession will stand lower by joining that congress, or by forming a section there, than it would if it were to stay out. I believe, therefore, that *if they can afford to invite us we can afford to go*. Furthermore, if the profession of which we have such an honored member here to-night, if the clergy of the world at any time should hold an International Congress and choose to honor us by asking us to come and take part with them, would we be demeaned thereby? Would we not be honored by the invitation? Should we decline? No. Let us go. (Applause.) So of the legal profession, or any other profession, or any other honorable vocation in International Congress assembled.

Out of the remarks that were made in that address to which I allude has grown a desire for an International Dental Congress, to be held at some time or other;

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\* "As an independent profession, we have no business there; as dentists, we are out of place."

a congress of dentists and for dentists; a congress of their own; a congress to which every reputable dentist throughout the world may come as his congress, and not wait for an invitation. Steps have already been taken, a temporary organization has already been formed, which is in no sense hostile to the Section of the Medical Congress. The present duty of the temporary organization is to provide a plan for a permanent organization which shall, in the estimation of those who are interested in it, best call out universal support; the time and the place and everything except that one thing being left open, and for the consideration of gentlemen who have the highest interests of the dental profession at heart, as above all other interests of a scientific nature, and with those gentlemen we can safely leave the whole matter. So far as I am personally concerned, and so far as my associates are concerned who are interested in the International Dental Congress, so far as I can speak for those who think with me that dentistry is an independent profession, I say to you gentlemen who are the officers, and you who form the council and the government of the Section of Dental and Oral Surgery in the International Medical Congress, that we pledge to you our full sympathy, our moral support, and, so far as it is in our power, our active support, until your work is accomplished. (Great applause.)

And, furthermore, as the president of the State Society, while I cannot pledge that society, I can pledge you this: I believe that next May there will be a larger meeting of that society than was ever held before, and whatever influence I have shall be used to give the whole support of the State Society to the Dental Section of the International Medical Congress, so that it shall be without any possibility of doubt a complete success and creditable to dentistry in America. (Applause.)

One thing more. Speaking for the gentlemen who are interested in the International Dental Congress, I say, while we pledge to you gentlemen who represent the section of the International Medical Congress our moral and active support so far as in our power to give, we ask in common fairness that you will give to us, when the time comes, the same generous support for the International Dental Congress,—a congress of dentists and for dentists. (Great applause.)

## DENTAL LEGISLATION IN THE COURTS.

TO THE EDITOR OF THE DENTAL COSMOS:

A case of general interest, as showing the powers and duties of State Boards of Dental Examiners, and the dangers of the abuse of the trusts reposed in such officers, has recently arisen in Illinois. That State has a statute by which it is provided that all persons desiring to practice dentistry within its limits must either submit to an examination by the board or possess a diploma from some "reputable" dental college, in which is delivered annually a full course of lectures and instruction in dentistry.

In 1884 the board, acting under the above provisions, refused to recognize the diploma of a certain dental college, deciding that it was not "reputable" in the sense intended in the statute. The applicant, deeming himself aggrieved, applied to the Supreme Court for a writ of mandamus, to compel the board to issue license, con-

tending that the law itself had defined what was a reputable college, and that the board was not clothed by the statute with discretion to decide the question. The board demurred to this position, contending that their discretion was ample, and that their decision could not be controlled by mandamus. In this claim they were sustained by the Supreme Court, which held that the board had full power to decide upon the question of reputability, and the mandamus was therefore refused.

This decision certainly settled great and delicate powers upon the board. But the question was not to end here. In 1884 the board adopted a regulation (identical with that of the National Association of Dental Faculties) as follows:

*Resolved*, That after June, 1885, the Illinois State Board of Dental Examiners will recognize as reputable only such dental colleges as require, as a requisite for graduation, attendance upon two full regular courses of lectures and practical instructions, which courses shall be of not less than five months' duration, and shall be held in separate years, with practical instructions intervening between the courses. Such colleges must also require a preliminary examination before admitting students to matriculation, provided that no certificate from a high or normal school or other literary institution is presented by the candidate.

In 1885 the "Northwestern College of Dental Surgery" went into operation at Chicago. In its announcement it set forth that it had adopted the above requirements as to candidates for graduation. Among its students was one Jno. M. Cooper, who had attended a previous course at the Chicago College of Dental Surgery, an older institution. He was duly graduated by the Northwestern College, in April, 1886, and soon after, at a regular meeting of the State Board, presented his diploma and demanded a license. This was refused. After waiting a reasonable time, Cooper addressed a letter to the secretary of the board, inquiring why his license had not been issued. In reply he was informed that the case had been referred to the National Association of Dental Examiners, and until they met in August no license could be issued; and his fee of \$1.00 was returned. Upon this, a resort to the courts was determined upon, but before the papers were filed the attorney of the petitioner was informed by the secretary of the board that if he would wait until a meeting could be called a license would be issued. The attorney did wait, but when the meeting was held, instead of issuing a license as promised, the board refused it, and found that the Northwestern College was not a reputable institution.

Thereupon Cooper's attorney filed a petition for a mandamus, in the Circuit Court of Cook County, to compel the board to issue license. This petition presents a remarkable array of charges. After reciting the facts as above given, it charges that the decision as



to the reputability of the college was not based on proper evidence, but was arbitrary, wicked, and malicious, and inspired by the malice of the board toward the petitioner, because he had left the Chicago College of Dental Surgery and gone to the Northwestern College, which latter it was the design of the board to maliciously injure, cripple, and destroy, by refusing to license its graduates. It was further charged that, out of the five members of the board, four were connected with the Chicago College of Dental Surgery, either as faculty or otherwise, and that to protect their own institution they had shamefully and deliberately abused their powers. The petitioner claimed that the Northwestern College had fully complied with the law and the regulations of the board, and that having at great expense fitted himself for practice, and fully complied with the law, he was entitled to license. The question was stated to involve not only the rights of the petitioner, but the rights of dental colleges other than the Chicago College of Dental Surgery, and also the right of the people to have the board of examiners perform their duty without referring citizens to irresponsible associations unknown to the laws.

The State Board did not deny the truth of the charges, but set up a demurrer, wherein, besides sundry technical and unimportant matters, they pleaded the former decision of the Supreme Court, that they had power to decide what colleges *were* reputable, and that in the exercise of that discretion they could not be reached by the courts, even though the college and petitioner had complied with all requirements. The matter was duly argued and the demurrer overruled, and the board was ordered to issue the license. Instead of complying they appealed to the Appellate Court of Illinois. Here the matter was fully heard, and in due time a decision was filed. In an exhaustive opinion, the court, after reciting the law and the facts as alleged, says that the board, not having denied any of the charges, but electing to stand by its demurrer, admits the truth of the charges, and they must be taken as true. The board had, in the rule established, laid down its requirements, and thereby exhausted its discretion. There was no claim that the Northwestern College and the petitioner had not complied therewith fully. While the board had an undoubted right to define a reputable college, it had done so in adopting the general rule, which had been complied with, and upon such compliance it could not refuse recognition. To infer that there might be other requirements than those laid down in the rule, would be to impute bad faith to the board. The discretion lodged in the board must be exercised in a reasonable manner, and not regulated by caprice, which would render it corrupt in administration. "The board cannot be permitted," says the court, "to hold the

word of promise to the ear when the student enters his college, and break it to his hope when he presents his diploma." After the citation of legal authorities, the court says that the statements that four out of five members of the board were connected with the Chicago College of Dental Surgery, and that the action of the board was arbitrary and malicious, and taken with the design and purpose of injuring the Northwestern College and preventing it from getting patronage and competing with the college with which they were connected, must be taken as true; "and taking them as true, they show a clear abuse of discretion on the part of the board. Where discretion is vested, it cannot be exercised arbitrarily, and for the gratification of feelings of malevolence, and for the attainment of personal and selfish ends." In conclusion the court says:

The case here, then, stands thus: The board admits that relator tendered the proper fee, and a diploma issued by a college regularly organized, which complied in all respects with the rule of the board; and that the board, knowing such college to be reputable, refused a license, and falsely, fraudulently, and maliciously, and with the purpose of unjust discrimination against the Northwestern College, and in favor of a college in which the individual members of the board are pecuniarily and professionally interested, pretended to find that the Northwestern Dental College was not a reputable college. The board cannot admit such allegations, and escape the control of the courts on the suggestion that the discretion reposed in it cannot be interfered with.

The opinion of the lower court was sustained, and a mandamus was granted.

The State board, however, has appealed the case to the Supreme Court of Illinois.

C. STODDARD SMITH, D.D.S.

## PROCEEDINGS OF DENTAL SOCIETIES.

### FIRST DISTRICT DENTAL SOCIETY, STATE OF NEW YORK.

THE First District Dental Society of the State of New York held a regular monthly meeting, Tuesday evening, December 7, 1886, in the rooms of The S. S. White Dental Manufacturing Company, Broadway and Thirty-second street.

The president, Dr. William Carr, in the chair.

Dr. C. F. W. Bödecker, chairman of the Clinic Committee, reported as follows:

Mr. President and Gentlemen: I have to report a very interesting and largely attended clinic to-day. . . Dr. W. I. Thayer, of Brooklyn, was present and exhibited a mechanical mallet which is worked by the dental engine. It is a new device, and so far as I have seen and tested it I like it as well as or better than any other mechanical

mallet I have tried. It has a stroke similar to the electric mallet, but I think it is less annoying to the patients, and that they will like it better. . . R. A. Holliday, of Atlanta, Ga., sent some of Teague's depressed sand-paper disks which were distributed for trial. . . Dr. C. F. Wheeler, of Albany, was present and exhibited some cases of detachable bridge-work. . . Dr. Evans, of New York, presented some bridge plate-work, and described the manner in which it is made. He also exhibited some very soft and excellent broaches. He also explained his method of disinfecting devitalized teeth by hot air. This he does by heating a thick piece of silver to which is attached a thin process, about the thickness of a broach; the silver bulb gives heat to the broach-like appendage, which is put into the tooth to expel the moisture. When the tooth is thoroughly dried he applies a solution of iodoform in ether, thereby disinfecting the dentine thoroughly. He then fills the apex of the root with a little cotton, dipped in a solution of iodoform, and follows that with solid gutta-percha. Dr. Evans also explained how to make and adjust bands around roots of teeth, and how to make them fit tightly by the use of his new set of burnishers, of which he has eight. He promised to be present at the next clinic and continue his exhibitions and instruction in this class of work, which I think is valuable. . . Dr. W. E. Truex, of Freehold, N. J., presented a model of what appears to be, and undoubtedly is, a double supernumerary tooth. He has been unable to find any separation, the two teeth being firmly joined together on one root. . . Dr. J. G. Morey exhibited a crown the new feature of which is a hollow pin. In case of breakage the crown can be removed with much more facility than where the pin is solid. . . Dr. E. Parmly Brown presented a patient for whom he inserted a lower plate of celluloid. . . Dr. O. F. Coe presented the root of an upper wisdom-tooth with two very large abscesses. . . Dr. S. C. G. Watkins exhibited a screw plate, with which he cuts conical screws for crown-work or large fillings. . . Dr. Steurer filled some cavities out of the mouth with his new gold. He also exhibited some specimens of teeth filled out of the mouth, and a piece of gold which had been filled into a cavity carved out of a stone. The impression of the gold in the stone was perfect. I will ask Dr. Dwinelle, who has experimented with the plastic gold, to make the report upon it. Dr. Dwinelle: Mr. President, three or four samples of new gold were presented to us for testing; among others the Nuremberg or German gold. Under the microscope this gold is decidedly crystalline in character, but it is difficult to manipulate on account of the coarse quality which it possesses. Nevertheless, after you have succeeded in making fillings with it they appear very good. I think we have very much better gold here in America. The gold presented by Dr.



Steurer is adhesive, somewhat harsh, evidently pure, and takes a fine impression of surfaces. It is manipulated with coarse-pointed instruments. Dr. Steurer claims that the specimen with which I experimented was not as good as he now manufactures. I presume that is so, because it is rather poor, brittle, and crumbly in character. Still, it is much better than the German gold. I think that when it is further improved it will be a very interesting article, and an acquisition to our profession, and will perhaps supplement at least our materials for filling teeth. I trust that he will improve it. I do not find any of these golds equal to the best quality of the Watts crystalline gold. It lacks that soft, mellow, kid-like quality and adaptability to the walls of the cavities which the Watts gold possesses. Although good may grow out of these new golds, especially Dr. Steurer's, I think it will be a long time before they equal the best quality of the Watts crystalline gold—No. 1 especially, which is soft, delicate, and conforms itself to the walls of cavities with wonderful persistence of adaptation. In regard to the Wilson gold, I think we have said quite enough heretofore.

Dr. E. L. Swartwout, of Utica, N. Y., read the following paper, entitled

#### THE PREPARATION OF CAVITIES AND FILLING WITH CRYSTAL GOLD.

Mr. President and Gentlemen: I am to speak to you this evening, first, on the preparation of cavities in tooth-structure; and, secondly, on filling teeth with Watts's crystal gold.

Under the first division, with cavities easy of access, I proceed in the usual way to trim off the thin, rough edges with chisels, excavators, and files; then, after removing the débris and soft bone with excavators and hoes, commence with a round cavity bur of proper size, and bur out the sides of the cavity from within outwards, by a motion like wiping it out with a pledget of cotton, using only the sides of the bur in the operation, leaving the cavity smooth and clean to the margins, with no edge or shoulder. During the past year I have been using for this purpose a new form of bur of my own pattern, designated as the oblong bur, which accomplishes this operation with greater safety to the patient and facility to the operator than the round cavity bur. The improvement consists in having the bur elongated, in order to secure straight and level sides, whereby it can be retained or held on thin, sharp edges of enamel while running rapidly; with the extreme end like a round bur with the grooves cut finer (from 14 to 16) and more straight on the sides than on the rounded point. (Figs. 1 and 2.) I now take an 0, 00, or 000 round bur (depending on the size of the cavity) and run a

groove around the inside of the margins to form the shoulder; then remove the dentine from or back of the groove towards the bottom of the cavity, with a larger bur, or with a round-pointed hoe, by cutting it down nearly on a line with the bottom of the groove. As a rule, I prefer the round to the wheel bur for grooving, on account of greater strength of edge, lessening the liability of fracture; and, as will be readily seen, the gold can be more perfectly packed in the concave than in the square groove made by the wheel bur. (Figs. 3 and 4.)

Like all general rules with exceptions, there are cases where, in very shallow surface cavities, in localities almost inaccessible, with strong margins, it is necessary to use the wheel bur to get a sharply-

FIG. 1.



FIG. 2.



FIG. 3.



FIG. 4.



Sectional view of Cavity with concave groove;  
A, A, dentine to be removed after groove is formed.

Sectional view of Cavity with square groove.

defined edge to securely anchor the filling; but great care ought to be taken to thoroughly pack the gold in this groove, and special instruments with square or flat points should be used for that purpose (of which I will speak hereafter).

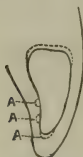
In some cases it is advisable, instead of the continuous groove, to make shallow, concave pits, a slight distance apart, or short grooves at intervals. This gives an edge of greater security where the walls are thin and frail; the support of the bony partitions being like buttresses to the wall of a brick or stone building. (Figs. 5 and 6.)

Then we have cases of approximal cavities in the incisors, where the side walls are so thin that we can form no shoulder, but must rely upon anchorage at the cervical wall, and the point near the cutting edge of the tooth. It is well if we can get a slight incline or draft inwards on the side walls to help us out. The direction of the draft of the marginal edges must depend upon circumstances. In the last case mentioned I would have the draft inward in order to get all the anchorage possible for the filling. In cavities with good anchorage I

would make the edges straight or level, with no draft either way. This applies only where crystal gold is to be used as the filling, to be inserted in the manner and according to the directions given in the second division of my subject—viz., the packing of the layers of gold must be against these margins by lateral pressure, and if properly done is immovable by after condensation, whereas in the use of gold foil the position of the layers against the margins is disturbed and changed by after compression and condensation, so that there is a liability to have spaces between the gold and margins, resulting in leakage, etc.; therefore the draft of cavities to be filled with foil should be slightly outwards, in order to close the joint more perfectly by the condensing.

In the case of approximal cavities in bicusps and molars, in teeth with flattened or irregular surfaces, I first prepare those surfaces for contour fillings; if the teeth to be operated upon are in close contact, separate them by previous wedging with rubber, or by immediate

FIG. 5.



Outline of Approximal Cavity in central incisor, with concave pits, A, A, A.

FIG. 6.



Outline of Approximal Cavity in central incisor, with short grooves, A, A.

wedging with a separator; when sufficient space is secured, round off the buccal and palatal corners adjoining the cavity, to give it the regular shape or contour that it ought to have, or a perfect tooth should have, before decay, using rubber, corundum and paper disks, sand-paper and lava strips of different degrees of fineness, and so finish the surfaces before excavating the cavity in detail, in order to prevent subsequent injury to the shape of the filling, which is very liable to occur in attempting to finish tooth-surfaces after the filling is contoured. This I hold to be of greater importance than putting a jeweler's finish on surfaces of gold fillings, and neglecting adjoining tooth-structure, as too often is the case in dental work made to exhibit. If necessary for better access to the cavity, cut down from the grinding surface and make a compound filling of it, according to the usual practice of all good operators. In teeth of good contour that are decayed on the mesial surfaces, of course we preserve the enamel intact; all that is required is to secure the space necessary by any good method so that the teeth can be readily operated upon. In burring out any sensitive cavity I always use the rubber dam, if it is possible to apply it, so that the cavity may be kept free of saliva



during the whole operation, and then keep the cavity and the instruments moistened with oil of cloves. This, with new, sharp-cut burs, run rapidly, making quick, short passes or touches with the bur, for two or three seconds at a time only, usually overcomes the tenderness. In hypersensitive dentine (at the suggestion of Dr. E. Parmly Brown) I have used, with good success, equal parts of pure carbolic acid (Calvert's No. 1) and oil of cloves mixed, saturating the cavity two or three minutes before operating; also, with patients of fine nervous organization, instead of using the air-syringe to blow out the cuttings, I find a small and very fine camel's-hair brush, of a size adapted to the cavity, very effective in the removal of the cuttings, without the unpleasant sensation or nervous shock sometimes produced by the blower,—in fact, the touches of the brush are usually unnoticeable.

The last operation previous to filling is to scrape or smooth the margins of the cavity with an excavator, or square-pointed, hoe-shaped instrument, to remove the rough, ragged edges left by the bur, in order to make a more perfect joint with the gold. I employ, when practicable, fine corundum points for this purpose, using the finest corundum powder on a worn-out No. 1 or 2 round or wheel bur, coating the bur with shellac, then with the pulverized corundum; when hard, turn it to any shape desired by running it rapidly in the engine against any of the very hard woods. It is my belief that, if this operation (simple as it may seem) is faithfully performed in all cases, we shall hear less of failures with gold as a filling material; for the margins of the cavity are the vulnerable points of attack by acids and the fluids of the mouth, resulting in the loss of multitudes of the very best and most artistic fillings, all for the want of a little more attention to details, in order to protect and fortify the weakest point in the structure. To prove this, I selected a tooth out of the mouth that had a very small cavity on the approximal surface, and prepared it as I would for filling, with great care, using only a sharp, fine-cut bur. When complete the cavity was one thirty-second of an inch in diameter. I placed it under the microscope, with a power of 500 diameters, and the appearance of the margins was like unto a circular saw—only it was not as true and perfect a circle as a saw of that kind should be when it leaves the hands of a good mechanic; but, on the contrary, it looked like a saw that had been struck by lightning, which had run around the edges, demoralizing the teeth, but leaving the body of the saw intact. All around the margins it was one series of minute fractures of the enamel, which could not be detected with the naked eye. When we come to think of it, why should it be otherwise? This cutting against and into layers of the hard crystalline structure

which constitutes enamel with steel instruments resulted in just what might be expected. I then lightly and carefully scraped the margins, and again placed it under the same magnifier, and its appearance was more orthodox and respectable—in other words, it was vastly improved. The corundum points will make a smoother surface and more perfect finish than any steel instrument.

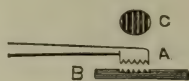
The preparation of a dental cavity for a metallic filling should be carefully studied and measured with the eye in regard to anchorage, security, and contour of the filling to be placed in it, as also the outlines of tooth and filling as it will be when finally completed for beauty, safety, endurance and good care by the patient. All these can be seen with the mind's eye of the artistic dental operator—just as the sculptor sees his ideal as perfectly in his mind as though it were before him, in all its reality, a complete and finished work of art.

*Watts's Crystal Gold.*—Watts's improved crystal or (as it is sometimes called) sponge gold, from its resemblance to fine sponge in color,

FIG. 7.



FIG. 8.



Crystal gold Matrix (B) made by plugger-point (A); face view, C.

porosity, and lightness, is deposited from a gold solution by a battery. Upon examination under the microscope we find it a mass of beautiful and brilliant crystals, resembling delicate fern-leaves interwoven with each other; of a light, feathery nature, very bright and sparkling, like burnished gold—a wonderful contrast to its dull-brown appearance to the naked eye. (Fig. 7.) Instruments with sharp points easily penetrate through it; fine serrated instruments quickly enter it and chop it up; instruments with broad surfaces, file-cut or bur-cut, properly manipulated, gradually pack and condense the crystals together in one solid mass resembling molten gold, so that it may be rolled out like gold plate. It is therefore evident, from the nature and construction of this material, that it is of vital importance that instruments of the right kind be used in its manipulation, or sooner or later the word failure will be clearly stamped on its face. Most of the instruments manufactured for working

crystal gold have answered the purpose well, especially those brought out and introduced by Drs. Dwinelle and Ballard, when this gold was in its infancy, which were made on the principle of broad, flat surfaces, file-cut or cross-cut. These were safe in the hands of careful operators. So all praise to the bridge that has carried us safely over to this point.

While we cannot rely upon welding this gold together as we can cohesive gold foil, by laying one sheet upon another and rubbing over the surface, thus making a perfect union of the two; yet the less it is worked up, molded, or divided the better, in order to preserve the projecting points so molded by the imprint of the instrument, and thereby secure the best condition to receive the subsequent layer and make as good a joint as possible.

The cross-cut faced instruments have a succession of points, which, stamped or pressed on the crystals, leave the same succession of points, which, by their weakness in standing as individual points, must of necessity be more or less broken up with the next layer pressed upon it. This is remedied to a great extent by using instruments that are filed only one way, avoiding all cross-cuts, so that the successive layers may fit together like a matrix. (Fig. 8, A, B, C.) This improved form of points I have adopted, as I con-

FIG. 9. FIG. 10.



FIG. 11.



Sectional view of Contour Fillings in first and second bicuspid.

FIG. 12.



Grinding Surface of the first and second bicuspid, with a view of the Contour Fillings.

sider them the best instruments for manipulating crystal gold, and find them to more than meet my expectations—especially the small bur points, cut as fine as a gold finishing-bur, with grooves cut straight on the sides and ends; with a good draft, not too deep, made to fit the grooves and around the shoulders of cavities. One can readily see that the form or shape of a plugger-point which best fits the pit, groove, or indentation around the margins like a die and counter-die will make the most perfect joint with tooth-bone. (Figs. 9 and 10.)

I use No. 1 gold, and prepare it by cutting it in thin slices with a very sharp bistoury, varying in thickness from the  $\frac{1}{64}$  to  $\frac{1}{16}$  of an inch (the latter to be used only in large cavities); place the different sizes in separate boxes, on clean white muslin, and cover them with a piece of glass, secured from any movement; cover the box tightly, and it is ready for use at any time by taking them out and



annealing only what is needed for each particular case. I find these leaves or slices to work fully as well as any gold fresh torn from the cake, for they are kept free from the air and dust, and are always ready for use. In filling an approximal cavity, I commence in the usual way to pack the gold at the cervical wall down and around the sides to the lower point of the cavity, filling up the center last. It is very gratifying in using the bur points with the first layer to find how readily the gold packs in the groove, and is so fastened without holding it there, as though it were glued to the dentine. The adaptability of this gold to very delicate, frail walls, enabling us to preserve teeth that could not be safely filled with the pressure required with gold foil, has been so well explained by Dr. Dwinelle, in his pamphlet on "Watts's Crystal Gold," in 1855, and has been so well demonstrated by him and others, that I need not enlarge upon this point.

I have been using the past year Wolrab's gold cylinders to line the walls of cavities before introducing the crystal gold; burnishing the cylinders around the margins with smooth points; then going over the foil with small serrated instruments and stippling it; then packing the crystal upon it. It adheres readily and works very satisfactorily, making a tight joint with the margins of the cavity.

It is of vital importance that crystal gold should be worked only in thin layers, which can be perfectly imprinted into the previous layer, and not in large masses, which only condense and pack on the surface, and are not welded or joined to the previous layer. This is the rock on which many operators have split in trying to do too much with it—to work it as they would soft foil. Especially was this the case for some time after its first introduction to the profession. Although the gold was right and the instruments were good, operators failed by improper manipulation, and therefore condemned the gold and abandoned it in toto. It will therefore be borne in mind that crystal gold packs solid from the bottom of the cavity to the surface, and that there is no need of after condensation, except upon the surface, to finish up and harden the last layer and remove all plugger-marks.

Injury is often done to crystal gold fillings by trying to condense with automatic or mallet pluggers, causing the top layers to loosen and scale off. The only safe instruments are the hand-pressure, supplemented in some cases with a small weight of brass or steel about one inch long, and one-half an inch in diameter, made to fit the top end of the pluggers, and removed at pleasure. This enables the operator to gently and rapidly tap the first layers around margins in the grooves of the cavity. Serrated instruments have been used, and can be used, in manipulating crystal gold, by care in

pressing the layer of gold to its place with a bur, and then going over every part of the surface with the serrated point; but it takes more time, and the instruments very often chop or cut up the crystals, and go through it, making imperfect work. Instruments with single points or two points are useful in testing the filling around the margins, when the cavity is full, to find any soft spots before burnishing. I proceed to burnish thoroughly every part of the surface with a small-pointed burnisher where the filling is accessible to it; then file, and finish down to the desired shape, repeating the burnishing at intervals after each dressing or filing, using the same implements as were used in contouring the tooth, being careful not to mar the tooth-surface adjoining the filling. Where the surfaces of contour fillings are so close to the adjoining teeth as not to admit the paper strips, I then use Dr. Brown's metal finishing strips with silex as the most effective thing I know of. (Figs. 11 and 12.)

Dentists who have used this gold have sometimes noticed a reddish-brown discoloration soon after the fillings were put in, and were alarmed on account of it, attributing it to impure gold; but it was soon discovered that it was hard burnishing with a soft steel burnisher, so that the particles of steel clung to or were imbedded in the surface of the gold and oxidized. This, however, was soon remedied by the introduction of burnishers of bloodstone and agate. But in those early days of crystal gold the prejudice against it was not entirely removed, and some were afraid to use it thereafter.

I have avoided in this paper making comparisons with other forms of gold, as unnecessary and unprofitable, for our practice is so varied, and the most of us are so well settled in our methods and use of the different forms of gold, that it is well for us to make haste slowly; for I know that good work has been done and is done with the old stand-by gold foil, and it has served the profession well.

I have endeavored to give you only a plain, practical talk upon a subject in which I have a very deep interest, and one that I thought not quite clearly understood in all its points by some of our profession; and while I have entered into minute details, it has seemed unavoidable in order to present the proper working of crystal gold and the beauty of a crystal gold filling when complete. This has been my favorite filling during most of my practice since 1855, when Dr. A. J. Watts (then a resident of Utica) first brought me a sample of his gold for trial. I at once adopted it, and have cases of fillings put in at that time doing service to-day. While I have used foil of different kinds and forms successfully at sundry times since, yet I have generally come back to my first love with greater admiration, because she has helped me through so many difficulties, and proved so royal a friend, that it is only a labor of love for me to present her to you this evening.

Dr. Dwinelle. Mr. President, you will agree with me, I have no doubt, when I say that it is a great pleasure to be indorsed by so respectable an operator. Years ago, when I first entered the profession, I used to lie awake nights, and dream and hope and believe that the day would come when gold would be brought into such a plastic condition that we could build up independent forms with it. I consulted books on metallurgy, and I studied chemistry afresh, but I found no solution of the question from any of these sources, for they all forbade the idea that gold under any circumstances could be made plastic. That tin might weld, that iron and steel might weld, and others of the inferior metals, was conceded, but gold was not one of them. About that time I was in Baltimore one day, with my worthy friend Dr. Harris, and he showed me a specimen of gold that Dr. Charles T. Jackson, United States assayer at Boston, had made out of a solution of gold, *aqua regia*, precipitating the gold with oxalic acid, I think. This gold was adhesive, and it was plastic in a large sense, but we found it contained within itself the elements of its own destruction; the fillings made with it disintegrated, tumbled to pieces and came out. But here was a denial of the theory that gold could not be made plastic. Then I went on with certain other experiments, with "plastic" golds made both at home and abroad. About this time Dr. A. J. Watts came to my native place, Cazenovia, and we joined forces and worked together for years afterwards. In the course of time the present form of crystal gold, the fern-leaf or perfected variety, was produced. I was reminded to-day of this fact by looking over a treatise on crystal gold which I gave to the profession and published in the *American Journal of Dental Science* for April, 1855. The history of crystal gold from that time forward is as familiar to you as to myself. For years I used nothing else; now I use everything connected with gold, and I delight in everything that promotes the perfecting of gold as a material for filling teeth. Unfortunately, crystal gold has had a black eye every now and then, and it deserved it. The gold first put upon the market was of a very excellent quality; it was distributed around among the members of the profession, and I had the pleasure of being the distributor and practical demonstrator of it, and I of course indorsed it and put pledges upon it; but the next lot would be very imperfect and unsatisfactory, much to the disappointment and loss of those who received it. It was sent back, and the error in the course of time corrected. Then after a while another imperfect article would be sent out; and the dentists would talk about brick-dust, disintegration, etc., but the true reason was that my worthy friend Dr. Watts was inclined to experiment too much; and, worse than



that, he was not always inclined to wash out all the salts contained in the gold, or other causes which led to failures, and hence there was left within it the elements of its own destruction; a result so well known to the profession at large. But crystal gold pure and simple, such as we are now supplied with, has done more, in my opinion, for elevating the profession than any other form of gold. Out of it has come contour fillings and other operations unparalleled and never dreamed of before.

The president here introduced Dr. J. Edw. Line, of Rochester, N. Y., who read a paper entitled

#### RHYTHMIC CHARACTER OF FUNCTIONAL ACTIVITY IN TEETH.

Activity necessarily characterizes everything engaged in the performance of work, and involves, also necessarily, change of place, of state, or of composition. Celestial and terrestrial things alike exhibit it, both in general and in particular, the latter especially in things that come within the range of everyday observation and experience, and more especially still in things to which we constantly apply the terms *life* and *living*, or some of their many word-equivalents. That this activity, regardless of the nature of its source or of the thing manifesting it, is or may be made for the time being functional, goes without question. The function of the steam-engine is to drive machinery, haul trains, propel boats; of batteries and dynamos to generate electricity; of horses to drag plows, draw wagons, carry riders, win races. A man wielding an ax, a boy pushing a cart, a pair of legs carrying a body, a stomach engaged in digesting its contents; a cell secreting, assimilating, reproducing, are illustrations of things engaged in exercise that, for the time being at least, is functional; and it is functional in that it is the sum of this particular thing's activity in a given direction, or toward a given object, at a given time. A horse may pace, or run, or trot; but if entered for a trot, any change of gait will be charged against him as a failure to perform the special work for which he was entered, which is another way of saying that his function as a trotter, which is his only function for the time being, is impaired, at fault, or perhaps assumed. Thus we see that activity is necessarily involved in all change, whether of place, or state, or composition; and also that such activity is functional, for at least the time being, or while the thing manifesting such activity is engaged in the performance of certain work, or in the attainment of a given object.

The rhythmic character of this activity—its undulations, its wave-like, come-and-go, rise and fall character—is not always apparent,

certainly not always appreciable; but that it exists and characterizes everything of which movement of whatever kind has been or can be predicated may be proved by direct observation and experiment, and in things too far removed because of their intricate nature all but demonstrated by analogy.

The belief in the universality of this rhythmical movement of things was first formulated and published by Spencer, who thought for some time that he was alone in the belief that all motion is rhythmical, but discovered later that Tyndall had formally expressed his belief in the same teaching. To the former, however, belongs the credit of originality, and, as already stated, its first publication. Since then every attempt at a system of philosophy has had incorporated in and as an essential part of it the substance of Spencer's earliest effort, to which, by the way, little has been added except illustrations of the wider application of the principle by him laid down. Others have availed themselves of what he has said in their attempts, in their special fields of work, at the study of this rhythmic character of movement in things, and like them we look to the same source for a few illustrations in the several fields of knowledge to aid us in the attempt to show, by facts directly observable and by analogy, that rhythm characterizes certain changes—perhaps all—in the growth, development, durability, rise and fall in quality and increase and decrease in number of the dental organs, with some reference to their nutritive function, as displayed in their structure, their struggle individually with the elements that make for their destruction, and also and finally in the hopeless effort of the denture as a whole to ward off that fate that eventually overtakes everything that occupies standing-room in space.

To pave the way for what we have to offer as to the application of this principle to functional activity in teeth, we quote directly or in substance the author just named. He describes the effects of a breeze at sea, its increase to a gale, and characterizes the steady rise in the wind and its effects as rhythmic. "Ashore the conflict between the current of air and the things it meets results in a like rhythmical action. The leaves all shiver in the blast; each branch oscillates; and every exposed tree sways to and fro." Blades of grass and stalks of corn "exhibit the same rising and falling movement," and houses and blocks of houses shudder under the application of the same force. In water we see a like state of affairs. "Submerged weeds growing in the middle of a brook undulate from end to end. Branches brought down in the last flood, and left entangled at the bottom where the current is rapid, are thrown into a state of up-and-down movement that is slow or quick in propor-

tion as they are large or small. . . . In shallow places, where the action of the bottom on the water flowing over it is visible, we see a ripple produced—a series of undulations. . . . An artificially straightened channel is eventually changed into a serpentine one. A stick drawn laterally through the water with much force, proves by the throb which it communicates to the hand that it is in a state of vibration.” The screw of a steamer, “instead of a smooth rotation falls into a rapid rhythm that sends a tremor through the whole vessel. . . . The sound which results when a bow is drawn over a violin string, shows us vibrations produced by the movement of a solid over a solid;” and lathes and planers mark the rhythm of their movements in a series of waves in the work,—a fact noted by the observant workman, who says the machine “jiggers.” “A railway train inevitably gets into oscillations, both lateral and vertical;” bodies striking and bodies struck “are made to tremble; and trembling is rhythmical movement. . . . Every fresh discovery confirms the hypothesis that light consists of undulations. The rays of heat, too, are now found to have a like fundamental nature: their undulations differing from those of light only in their comparative lengths.” So of electricity: “The northern aurora may often be observed to pulsate with waves of greater brightness; and the electric discharge through a vacuum shows us by its stratified appearance that the current is not uniform, but comes in gushes of greater or less intensity.” And no matter how perfect our burring engines, whether run by foot, water, or electricity, they run irregularly, buzz, whirr, and even sing, with a rhythm that is noticed alike by both patient and operator; while the mercury in the thermometers of our vulcanizers rises by jerks, and the pointer of the steam-gauge shivers its way to the limit imposed by the attachment that governs the flow of gas.

It is a long way from teeth to stars, but many principles are of universal application, and in such cases distance fails to count. We are told, “Double stars . . . exhibit settled rhythmical actions in distant parts of our sidereal system;” and another fact of like general significance makes the variable stars brighten and fade—stars that wink, and to a purpose, but only at uncommonly long intervals.

Of terrestrial processes that exhibit marked rhythm, dependent more or less on the change in the amount of solar heat utilized by the several parts of the earth, we have magnetic variations,—diurnal, annual, and decennial increase; ocean currents flow from the equator to the poles above, and from the poles to the equator beneath, accompanied by corresponding and similarly-produced changes in the atmosphere overhead, many of whose variations are more or



less accurately recorded and published by the Signal Service Bureau, the imperfect study of which, and premature conclusions based thereon, have made the venturesome Wiggins a terror to the superstitious.

And so on through species whose rise and fall, or increase and decrease, is rhythmical—where they have appeared, become abundant, and disappeared. So in society, whether the wandering tribe or fixed community; and in political parties, republican or democratic, each of which, like the traditional dog, has its day.

As to illustrations of rhythm among the phenomena of life, we quote the following paragraph. Spencer says, and Fiske repeats, "The swallowing of food is effected by a wave of constriction passing along the esophagus; its digestion is accompanied by a muscular action of the stomach that is undulatory; and the peristaltic motion of the intestines is of a like nature. The blood obtained from this food is propelled not in a uniform current but in pulses; and it is aerated by lungs that alternately contract and expand. All locomotion results from oscillating movements. . . . These modes of activity have their recurring periods of increase and decrease. We see this in the periodic need for food, and in the periodic need for repose. Each meal induces a more rapid rhythmic action of the digestive organs; the pulsation of the heart is accelerated; and the inspirations become more frequent. . . . Waste and assimilation are not balanced by every meal, but one or other maintains for some time a slight excess." Then we have "those alternations of greater or less vigor, which even healthy people experience. So inevitable are these oscillations that even men in training cannot be kept stationary at their highest power, but when they have reached it begin to retrograde. . . . Sundry disorders are named from the intermittent character of their symptoms. . . . Patients rarely if ever get uniformly worse; and convalescents have usually their days of partial relapse, or of less decided advance."

Having seen in a general way that rhythm, which may be simple or compound, is characteristic of all movement or change, it follows that change in teeth, their growth, development, attacks of decay, their rise and fall, individually and collectively, are of the same character—that is, rhythmic.

Everyone has remarked the transverse markings or striæ in the enamel of incisors and cuspids,—in fact, in all the teeth of the denture,—but the former especially, their prominent position forcing their wrinkled faces to the front and on the attention of even the casual observer. In some cases the alternating ridges and grooves are now broad, now narrow, but ever present, and in one way or another clearly distinguishable. The question frequently arises at

home, Why these ridges and grooves in the child's teeth?—why these notches in the sides? When very marked the dentist's question is so framed as to call out a statement as to the child's health during the period corresponding to or with the development of these particular teeth; and the cases are rare indeed where the answer fails to include a description of one or more attacks, more or less severe and prolonged, of one or more of the several febrile diseases to which childhood is so subject. Impressions made during these periods are said to be abnormal—when the nutritive function suffered impairment; when the surroundings were such as to dispute occupancy of place; nevertheless they are of the same kind, differing only in degree, as the normal, and taken together illustrate very beautifully simple and multiple rhythm in quantity and complexity. A depression found, for example, at the neck of a sixth-year molar may be traced across the face of the central incisor not far from the neck, on the lateral a little farther down, and on the first bicuspid still nearer the cusp, while the second bicuspid and second molar escape untouched, and with them all other teeth undeveloped at the time of this depression-indicated suspension or modification of the nutritive function. When conspicuous, as just related, we jump at the conclusion, and often rightly, too, that disease, which is simply another way of saying that the organism has been driven toward if not to the wall by forces comprehended in the term "environment," has had a hand in the struggle of these teeth for a place among teeth normal in form and structure; but the further fact is sometimes lost sight of that this condition is simply an intensification—a continuation of forces whose effects are more or less clearly traceable throughout the enamel and dentine, and for that matter, perhaps, the cement itself. A deeper reading of this fact is found in simultaneously developed dentine and enamel. By sectioning antero-posteriorly a thoroughly dried incisor (dried because contrasting more sharply the air-filled spaces with the denser tissues, and also because of the readiness with which stains differentiate the perfectly and imperfectly developed parts), we can trace the lines of growth and development in both enamel and dentine, and though no special study has been made to determine the exact relationship existing between these lines in both dentine and enamel, it would seem as if some such relationship did exist, and that these lines indicated like conditions of growth and development of the matrix, and its stiffening by calcification. To illustrate,—the dentine-cells and the changes which they induce or undergo precede calcification of the enamel, by deposition or conversion, as you please, by a very little time, and to the extent of say a few layers or strata of cells. Then, during the further growth and development of the tooth, we have

additional layers or strata of dentine cells and the first layer of enamel cells, and with these comes a suspension or modification of the nutrition of the tooth. Then follows a corresponding modification of form and structure of both tissues, and to such extent that in the adult tooth we note the period at which this particular tooth became thus impressed. Later on this is repeated, and again and again, and it is just possible that these tracings not only mark the wave-like rise and fall movements in the nutrition of the tooth, but also correspond in character and time with those more plainly visible markings, the transverse ridges and grooves on the more exposed parts.

Two weeks ago we were struck by the fact that rhythm in functional activity showed itself frequently in daily practice, outside of the facts just related. In this particular case it could not be overlooked, nor could its meaning be perverted. In preparing cavities in the right central and lateral, we noticed in the former a series of cavities running lengthwise of the tooth and in the line of contact with the lateral. Two of these were fair-sized cavities separated by a septum of good enamel; the others were mere pits, and further on a few pin-point stains. Here seemed to be a contribution to the wider application of the principle of rhythm. The smaller cavities or pits marked a near approach to rhythm of the simple kind,—that rise and fall that seems to be natural or normal; the larger cavities coming under the head of multiple rhythm—a compounding or merging in which the first is obliterated and lost.

Microscopically we find a condition of things that seems to make the above rhythmic beyond a peradventure. Sectioned in the plane of such cavities, and at varying depths from the approximal surface, we find by using a weak staining fluid a vertical row of irregularly outlined spots, the stain showing deeply in the cavities and shading off to nothing at the margins, where begins good tissue. Sectioned transversely so as to include one of these spots, we find a crescent-shaped and colored field which would girdle the tooth if reinforced by contact, pressure, and other conditions that favor decay on approximal surfaces. Still again do we see this same thing in section in a plane with the labial surface of the tooth. Here, too, the hard and soft, the dense and porous, alternate with a degree of regularity that suggests rhythm in its formation. And this stratification, by the way, next to the micro-organisms themselves, is one of the most striking features of the Miller slides so generously passed about the country for examination by the preparator and his friends.

The seat of this modification of the nutritive function is of course the matrix—that in which the calcific matter is deposited; and this



deposit, by the way, seems to be incidental over and above a given amount, the stability of the tooth depending less on what is brought to it than on the strength of grip with which it is retained. So in all these things—ridges and grooves, contour lines of enamel and dentine, vertically arranged defects in approximal surfaces, the difference of parts in refractive power, their selective power as to stains, the correspondence of parts in sections cut in different directions—we see rhythm, within certain limits normal, beyond these limits abnormal and compounded with other movements—also, however, rhythmic in character.

When viewed from the clinical stand-point, the notion so far urged as a necessary condition of things finds further confirmation in the periodicity which marks the attacks of caries. The teeth may start well and hold their own for a time against the agents that tend to their destruction; but sooner or later a vulnerable place is found, and the first phase of tooth-destruction is inaugurated. This attack is not continuous, but intermittent, periods of rest following vigorous attacks. But again the process is set up, and again retarded or suspended, until the tooth melts away as débris in the secretions of the mouth. This naturally interrupted decay may be further complicated by treatment, but what may be termed secondary caries sets in, and in time does what the primary attack would have done in a shorter period, but with no greater certainty of effect. That it is rhythmic is conceded by the least observant member of the profession, and his faith in the coming of better or worse days for certain teeth or sets of teeth is shown in his expressed desire to see them at such and such intervals of time; also in his efforts to carry particularly frail teeth through certain periods, which he does by filling with tin-foil or some of the plastics. Of course, the sixth-year molar is the scapegoat of the denture, but other members of the series follow it more or less closely in groups, and, as seems to be the case, with a certain periodicity as to the time of the recurrence of decay and their final going out. The rapid progress apparent at one time, and the stand-still so marked at another, betray a rhythmic character in the behavior of the teeth, and indicate a relationship to if not dependence upon conditions already enumerated at length.

If we study the denture as a whole, we find present the same rhythmic character in its growth, development, and retrogression,—teeth erupting in a bunch, so to speak, and later on the other extreme, making the parent mind anxious as to the whereabouts of other members of the series, and leading it to question their coming at all. Before even the successors of the deciduous teeth are in place the breakdown of the permanent denture has begun, and already

advice is asked as to the retention of the sixth-year molars. Whether they are permitted to go on to destruction through primary decay, or patched up for a time with fillings that merely retard that process, or committed at once to the forceps,—a stage of comparative inactivity in the function of the denture as a whole has been reached that recurs with more or less of regularity while a single member of the series has a place in the mouth. Nor is it by these means alone that the denture is crippled. Sooner or later teeth must go, and if not broken down and carried off by that combination of forces known as caries, they are uprooted or forced from their places in the jaw by that other combination the leading signs of which are absorption of the alveolar process and recession of the gums. This is what does occur, and seems to be about what should occur. We hear daily, and members of our profession are by no means few who do not, at least in meeting, voice the same notion, that the teeth of man should serve at least the traditional three score years and ten, and go with him to his grave. This thing is not expected, even by dentists of other parts of the body, and pray why should teeth be made an exception? Eyes see less clearly, ears fail to catch certain sounds, finger-ends are less sensitive than formerly, and misinterpret or confound the objects of contact; the brain wearies with less and lighter work, the heart skips a beat and stumbles in its daily routine, the stomach falls from lobster-salad at midnight to oyster-broth at noon, the liver grows torpid and sleeps anon, and the kidney instead of shedding water passes a stone,—all of which means that organs, systems, and other combinations of parts of the organism, have their day—their rise and fall; that it is an unsteady climb to the summit of their growth, their development, strength, utility, in a word their functional activity, and having reached that summit there seems to be little else for them to do but go down the other side in the same unsteady fashion, and at the bottom of the decline pass into that diffuse state that makes for others' good. This ascent and descent, to repeat, are never steady, continuous, uninterrupted, but both up and down the movement is step by step and series on series of steps—rhythmic simple or multiple, but rhythmic just the same.

Dr. Atkinson. Mr. President, I am delighted with the paper, what I can understand of it, and pleased with the high mental tension exhibited in the attempt to grasp a subject that really lies at the foundation of our diagnoses of our cases. When this paper comes to us in print let us study it, write out our impressions and send them to our journal, and in that way we will pool our issues. Let each man give his best; and let us have that respect for each other that shall help each one to get his case before the court before we decide for or against it.

Dr. Kingsley. Mr. President, before we adjourn I move that the thanks of this society be given to the two gentlemen who have entertained us this evening.

Dr. Kingsley's motion was carried unanimously.

Adjourned.

B. C. NASH, D.D.S., *Secretary*.

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### ODONTOLOGICAL SOCIETY OF PENNSYLVANIA.

THE regular meeting of the Odontological Society of Pennsylvania was held on Saturday evening, November 6, 1886, at the office of Dr. Kingsbury, No. 1119 Walnut street, Philadelphia.

President Register in the chair.

The following paper was read by James Truman, D.D.S., upon

#### ROTATION AS A CONDENSING FORCE.

The introduction of the method of rotation by Dr. Wm. Herbst, of Bremen, has been followed naturally by a great variety of opinions as to its merits. Some of these, doubtless, have been the result of actual experiment, and others of observation; but from whatever source they have been derived, it must be conceded that the subject has been generously met, and the inventor recognized as an original thinker, an indefatigable worker, and one worthy the marked consideration he received from his colleagues in the United States. His recent visit to this country brought the matter more nearly home to every dentist, and forced investigation into the plan and modes of work. My interest began in it some two years ago, and at that time I endeavored to carry out his processes, as I then understood them. I reported the results to this association, and at the same time stated that, while there appeared to be something in the force evolved in rotation, I had not been able to secure satisfactory density. Close observation of repeated clinics given by Dr. Herbst, during his visit in July and August of this year, forced me to the conclusion that I had not done the subject justice. The matter was at once taken up and continued at intervals to the present time. The results of these investigations I propose to lay before you this evening.

You will observe, as I proceed, that my object has not been so much to sustain the process, as taught by Dr. Herbst, as to endeavor to find out the practical value of rotation as a condensing force. The illustrations given by him demonstrated that the rapid revolution of a conical point was equal to the production of a density sufficient for all practical purposes; but this condensation



was confined, in the estimation of the originator, to soft foils, or really to but one foil,—Wolrab's gold. It seemed as though this were a very inconclusive result, when it is considered that this power, to be of any real value, must be capable of universal application, and be governed by a law which, however explained, must at least be so far understood as to be applicable in a general sense. The burnisher-point as a condensing force is not, by any means, a new idea. The rounded, convex, or cone-shaped surface was regarded at the period of exclusive soft foil as an important finishing instrument. It was recognized as a series of inclined planes, acting on the well-known screw principle, crowding the laminae of foil together more perfectly than by direct action of the hand-plugger. It was not, however, applied to the rapid revolution of the engine until Dr. Herbst demonstrated its utility in this direction, and practically carried it farther than I have been able to reach with the same materials and the same mode of procedure.

Before entering into the main subject it may be instructive to glance briefly at the various steps taken in the process of filling teeth. This apparently simple operation has, in the evolution from crude modes, combined more thought and active labor than perhaps any other effort in dentistry. The remarkable advance made in the use of soft foil was amply demonstrated in the excellent work done prior to the introduction of cohesive foil. Then followed years of labor with this new form of material, and still a lengthened period with mallet force, until the present stage, when it would seem as though no further advance could be made in the condensation of gold. The period of wide separations gave way to the opposite extreme, and the reign of force by machinery has about displaced less rapid modes. Has this change been productive of good or evil results? The answer to this question is surrounded with immense difficulty. Facts are not at hand to form an opinion that will not be met with objections. Still, while we cannot definitely say that this or the other process has produced the best results, we may take an intelligent view of the work in its several relations, and find some data which may go far to solve the problem. It will be recognized, I think, as a fact by some of the older men in practice present, that the period of soft foil and wide separations was a time when but little was heard of cervical decay. This has been altogether attributed to the wide spaces, and it is perhaps true that to this must be given the greatest share of credit; but there still remains a possible reason to be alluded to hereafter. When cohesive foil was introduced the old process of hand-pressure was still the prevailing mode, and while some change was made in serrations, the direct force was

still used, modified to the character of gold employed. The introduction of the mallet was the beginning of a new era, and the subsequent changes from hand mallet to automatic, and from automatic to electric and mechanical, operated by power, was in the order of a natural and progressive development, and brought about a modification of modes in using gold foil.

Now, if it be true—and I think it cannot successfully be denied—that the use of soft foil produced margins more satisfactory than cohesive foil, and that hand-pressure, while not overcoming altogether mobility to the extent obtained by the mallet, still preserved the cervical border from the attacks of acid better than the greater density obtained by power mallets, then it remains important that the cause should be discovered. That there must be a reason for it, not explained by the mere difference in foils, must be apparent to the most superficial observer. The same result was secured in the use of cohesive foil under hand-pressure. The introduction of the mallet blow was soon followed by complaints that the cervical border on approximal surfaces was almost certain to decay, and in proportion to the multiplication of force has this difficulty been augmented, until many have come to the conclusion that the saving of this border was among the very doubtful operations. That the best operators with the electric mallet have failed at this point, is a notorious fact. One of the most skillful in the use of the mallet remarked to me that others might be able to make a good filling at the necks of the bicuspid, but he could not, and he had resorted, in his despair, to tin combined with gold. Others, equally skillful, have followed him with tin or amalgam, thus tacitly acknowledging that present modes are, to that extent, ineffective.

Is there any solution to this rather remarkable condition of things? We have had the fermentation theory and galvanic action brought forward to explain this, and while the former unquestionably has been demonstrated to have an important influence, the latter is still an open question, and both fail to explain the marked difference in results attained by the various modes in use during the past thirty-five years. The explanation must be looked for elsewhere, if it is to be found at all.

It is well known to all workers in the minute anatomy of dental tissues that the enamel is rarely free from cracks. These are not normal to the tissue, but have been produced by some occluding force, probably in the process of mastication, or it may be from the too sudden expansion and contraction caused by extremes of temperature. These cracks, by imbibition of fluids, predispose to the production of caries. This is so well understood that no intelligent writer can leave them out of the calculation of the causes of this

pathological condition. The extent to which these exist in any given tooth, in life, it is not possible to demonstrate histologically; neither is it possible to determine the character of the enamel border on any tooth during the operation of filling; but, reasoning from the recognized fact that cracks exist, we may fairly presume that they are present to a greater or less extent in all enamel, and that as they have unquestionably been produced by some sudden force, their number may be multiplied by an increase of an equal force, or indefinitely in proportion to the power applied. This leads us directly to the question of force in its application to this process. As we have seen that the filling of gold, either soft or cohesive, by hand-pressure, resulted more satisfactorily in the preservation of this delicate border, the question assumes importance, whether the increase of force, by a sudden impact, has not been productive of fractures at that particular spot, more so than elsewhere, on account of the direct mallet action. Tin, tin and gold combined, and amalgam have each been found superior to gold impacted by force. The reasons for this result have not been satisfactorily stated. Tin has been supposed to be more in harmony with dentine,—which is only another mode of expressing ignorance. Electrical action has been brought forward; but the proof is wanting to maintain this hypothesis; in fact, we are left with the practical fact alone that they do preserve better than gold. Until something more suggestive offers, I claim that the explanation can be found in the fact that these materials are ordinarily placed in with hand-pressure, or no pressure at all, as in the case of amalgam. I am forced to the conclusion that the meaning of immunity from decay in the use of soft foil, tin, and amalgam is not so much in the adaptation to the walls of these materials as it is in the introduction and freedom from injury to the enamel at the border line. This opens, it appears to me, a wide field for investigation. Whether results commensurate with the importance of the subject be attained or not, it should certainly lead to reflection and a better and more thorough examination of the basic principles of practice in this direction.

If these views have a correct foundation, then a further consideration of reasons for rotation, as a condensing force, may be important. I say may be, for the time has not yet arrived, in my opinion, when any dogmatic assertions for or against can be tolerated. The process of rotation must be judged on its possibilities, rather than on what it has as yet accomplished. No process can be truly estimated, as to its merits, until it has run the gauntlet of years of critical observation. It comes to us, however, at a period when the highest perfection, probably, possible has been reached with present modes; and it also comes to minds trained in



the experience of all other forms of practice, and hence can be judged intelligently in the light of past experience,—an experience that covers all forms of practice with all forms of material. As it has been seen, if my statement be accepted, that the use of hand-pressure with gold or other metals has been more uniformly successful in preserving teeth from caries than the more sudden force, it follows, I think, that any process that combines this advantage of hand-pressure with an almost equally great condensing power with the electric mallet must be of great value, if it be not the most perfect application of force yet devised.

The difficulty in the process, as originally explained and practiced by Dr. Herbst, lies in the fact, heretofore stated, that it confined the practice to very soft or so-called velvet foils. This seemed to me to condemn it as of no great practical value; nor could this statement be conceded without additional proof. Experiments with various foils quickly satisfied me that, with a slight change in manipulation, equally good or better work could be produced than with the velvet foils. It was observed that Dr. Herbst made use of broken excavator points, preferring the natural serrations of the crystalline structure to any artificially produced. He used this form of pressure to such an extent that the criticism was, I think, fairly made that he used two-thirds hand-pressure to one of rotation. Whether this be true or not, the hand-pressure preceded the rotary movement, and that, in my judgment, with a very imperfect instrument. Acting upon this, I adopted the sharpest serrated points I could find,—in fact, using the old, long, serrated instruments that fell largely into disuse after the introduction of power mallets. It is questionable whether the abandonment of these sharp points for very short ones, merely sufficient to roughen the gold, was not a mistake. Not a few have come to this conclusion. Be this as it may, the reason for objecting to them, of pitting the gold, has no force with rotation, for it must be evident that the constant burnishing of the surface will remove any pits left there by the serrations.

It is, I think, generally recognized as a fact that the property of cohesion cannot solely be relied upon. The conditions of the surface of gold are not always the same, and, if not universally up to the highest point of welding, an artificial substitute must be accepted. This, in rapid malleting, is accomplished by driving the laminae of foil into each other, and does not necessarily require deep serrations. With hand-pressure it is quite different, and these should be made strong, sharp, and deep.

In the preparation of the cavity and in the selection of gold foil there need be no difference from that which ordinarily obtains. Good cohesive or non-cohesive gold foils may be used at the pleasure

of the operator. I have used both; but as my experiments have been aimed to endeavor to employ cohesive with a rotary force, I have selected the former in the samples I present you. The plan I adopt is simply to pack with hand-pressure,—not being particular to go over the entire surface with the serrated instrument, but sufficiently so to insure adaptation to the part previously inserted; then with the steel, oval point (Herbst series), or what is much superior, the agate point, condense with some degree of force, going carefully over the surface. This operation is repeated until the cavity is full. It will be found impossible to produce even condensation by this means. There will remain depressions over the surface; but these constitute no serious objection, if indeed they be not an advantage. They do, however, become a difficulty at the surface,—or it is so with the present form of instruments. I have tried nearly flat surfaces with some advantage; but they do not entirely overcome the pitting. My own judgment is that the last layers must be condensed by either hand or mallet force, using broad and short serrated instruments. The fillings presented here have, however, been entirely completed by the rotary process.

You will observe the two large molar fillings, made with tin, and quite dense. This metal is very perfectly condensed by this process. One of these was filled with old scraps,—a rather severe test; the other from fresh tin. From foundation to cusps no other force was applied beyond that described. The gold fillings were formed in the same way,—that in the bicuspid from gold scraps of a variety of kinds of foil, and the molar from the extra-cohesive gold of Kearsing. Both of these were held in the fingers, and represent, therefore, a high degree of solidity when the conditions are taken into consideration.

Some present will remember that I presented in the *Dental Times* of October, 1871, the conclusions of some months of careful work on the relative value of mallet force. The fillings that were finally prepared by different operators were weighed by the United States Mint, at my request, and the result demonstrated that in proportion to the rapidity of the impact was mobility overcome, and that hand-pressure alone, on a movable base, could not produce a density equal to the mallet blow, and that the ordinary mallet blow was unequal to the rapid blow of the electric. Hence a filling made by holding the tooth in the hand will necessarily lack density where hand-pressure is alone used. The time necessary to make similar and equally extended experiments with rotation has not been at my command, but the importance of a comparative examination of the relative value of the modes in use in condensing gold has not been lost sight of.

A number of fillings were prepared and weighed, but owing to the imperfection of the matrix used, were not regarded as conclusive. As far as they went they demonstrated the probability of equalling the density of that produced by power mallets. I am not, however, convinced of the possibility of condensing gold by rotation to the extent of that obtained by the sudden impact of the mallet.\* This is, in my judgment, not the most important feature of a filling. Close adaptation, and sufficient solidity to endure the wear of mastication, are the two important elements in success, and these must be accomplished without injury to the walls.

I have alluded to the possibility of fracture into microscopic cracks. This will, doubtless, be controverted by the assertion that no skillful operator will strike the wall. This may be true; but the fact nevertheless remains that the perfect operator has not yet been developed, and even if such were possible there would still remain the great mass of the careless or unskillful to work injury.

Without specially advocating the rotary movement as superior to all other forms, it must be conceded, in the light of experience, that adaptation to the walls can be made without the slightest danger of injury, and the union is almost perfect. In the specimens presented the teeth were purposely selected from a very old stock, and hence were dry and very brittle. The excavations were made with difficulty; I could have changed this by allowing them to soak in water for some hours, but preferred this test. I think, under the circumstances, they present a remarkable adaptation, and that without break in the continuity of the surface. I would also call attention to the small plate of rolled gold. This was made from a filling prepared in the same way, and rolled without annealing. It speaks for itself, and shows the perfect cohesion of parts. I believe this to be the severest test a gold filling can be subjected to. Unless the laminæ are perfectly welded there will be lines of fracture throughout. I would also call attention, in this connection, to the very probable practical use of the burnisher-point with mallet force. I have used this very satisfactorily in several operations in connection with hand-pressure, and the result has led me to infer that it is quite worthy of further investigation.

In reviewing the whole subject, I think the following points have been established: That a rotary force, applied as described, will condense any form of gold foil; that it is a safe mode to place in

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\* Since the above was written I have prepared a filling of  $\frac{1}{8}$  oz. Abbey's No. 4 cohesive foil. This was made with great care, and was as solid as, I think, gold can be made by this process; but, while very dense, it did not seem to me equal in solidity to that made by the use of the mallet. It was subsequently rolled into plate by Mr. Abbey, and a portion beaten into foil.



the hands of the most careless; that fracture of frail walls is impossible with it; that teeth ought to be preserved, by its use, equally as with non-cohesive foil, tin, or amalgam. With so much in its favor, it is certainly worthy the attention of all operators. That the mallet will be abandoned is not to be expected nor desired. All modes have a value, and will live and serve a valuable purpose. It is for us to aim to find the proper niche for all of these, that those who succeed us may avoid the mistakes of practice and the blunders of unphilosophical speculation. We need to be taught, and it is important we should teach that the only true road to knowledge is through experiment to theory, and not in reverse order; that no statement, however ancient, is worthy of the slightest consideration unless it be thoroughly sustained by facts; that a practice is one-sided, and therefore unwise, that deals only with the visible and fails to reach to the minutest manipulations; in a word, that a practice not based on a reasoning from cause to effect is deficient in the essentials to true success.

#### *Discussion.*

Dr. Darby. I have listened with much pleasure to Dr. Truman's paper, because I have been quite interested in the subject of late. When Dr. Herbst was in this country I witnessed several of his clinics, and when he went away he gave me several of his agate points. I have procured others of The S. S. White Dental Mfg. Co., and with them have been experimenting quite a little, after the Herbst method. A good deal of practice will be required before one can work with the same skill that Dr. Herbst exhibited in his clinics. I have questioned whether the fillings made by the rotary method, and of the Wolrab gold cylinders, are as solid as those made of cohesive foil, and with the mechanical mallet. I am convinced that it is not a time-saving method,—at least not in my hands. If a tooth is sore, I should think the rotary method would be much pleasanter to the patient than mallet force of any kind. There is, unquestionably, more in the Herbst method than appears upon the surface, and we cannot fairly judge of it until we have given it a fair trial.

Dr. Wood. Dr. Truman in his essay referred to the injury done to the enamel by the blows of the mallet. It occurs to me that it might possibly prove better to fill the margins of cavities by this process, though the bulk of the filling be placed there by other methods. I do not consider cohesive gold the safest or best to use at the margins of cavities, especially at the cervical walls, where so large a percentage of fillings prove failures.

Dr. F. M. Dixon. According to my observation of the operations

by Dr. Herbst, as performed at Dr. Bonwill's, I was impressed with the idea that there was more of hand-pressure used than of the rotary process; as by the latter he seemed only to solidify the outer surface, and to some extent to prepare it for the burnisher. I believe the many failures of fillings at cervical borders are very frequently attributed to other than the real cause. It very frequently happens that at this part there is a slight and almost imperceptible disintegration of the surface, which operators fail to remove, and which increases rapidly after the filling is placed in, causing the difficulty so frequently complained of.

Dr. Noble. I think we are indebted to Dr. Truman for his effort in this direction, not only in preparing his paper, but also for the specimens presented; it being an excellent idea to illustrate a paper in this way. It has been asserted that it is impossible to bring the gold into actual contact, and to force it into the existing angles by this method. Now, if the margins of our fillings be poor, the fillings will be worthless. But in a properly prepared cavity, the margins of which have been polished, there will be no angles; and retaining-points will be present in only a few instances. So that, by the use of a fine burnisher, the gold may be forced into close adaptation with the cavity walls more perfectly than by the use of large plugger-points; but if a wedge-shaped point be used the case is simplified. The solidity of these fillings has been proved by Dr. Truman, since the actual weight of those made by this method in a matrix is greater than those impacted by a mallet. When Dr. Herbst used the burnisher he rubbed it on sand-paper, not only to remove the gold from it, but also to roughen it. I do not fill teeth by this method myself, but think the burnisher should be used on all fillings, even after a mallet has been employed. If this is done, it must be productive of good. Amalgam fillings inserted by using an engine burnisher are much harder than those made by other means, as the greatest amount of mercury is in this way expressed, and should be taken up by the use of tin foil and the burnisher. They soon become hard, and are less apt to separate from the tooth-wall than usual.

Dr. H. C. Register. I am very much pleased with Dr. Truman's paper, from the fact of his having tried the Herbst system two years ago and failed; while this evening he presents us with a number of very beautiful specimens prepared after that system. While I think a cavity cannot be filled as quickly or solidly as by the mallet, I am led to believe, through Dr. Truman's success, that saving work can be done in this way. In regard to the saving influences of the combination of alloy and gold, being one of the pioneers in that method of operating, I have found by using the

burnisher in packing amalgam its crystallization is made more certain. I use amalgam at the cervical margins in approximal cavities simply for the reason that I think it makes a more perfect adaptation at that point. I witnessed Dr. Herbst's clinics, and was pleased with his ingenuity, he being certainly a genius; and while I believe there are elements of good in his method, and that it will eventually stand upon its individual merit, I think it would not have received the same attention from the profession had its author not been a guest, backed by the German element of the country.

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The regular meeting of the Odontological Society of Pennsylvania was held Saturday evening, December 4, 1886, at the office of Dr. H. C. Register, No. 1907 Chestnut street.

President Register in the chair.

Dr. W. G. A. Bonwill read his paper upon "The Herbst Rotation Method vs. the American Systems of Filling Teeth with Gold," previously read at the November meeting of the New York Odontological Society.

[Dr. Bonwill's paper was published in our February number, page 94.—Editor DENTAL COSMOS.]

#### *Discussion.*

Dr. Thomas. I feel a little out of place in taking part in the present discussion, and would not do so were it not that in his essay Dr. Bonwill expresses the belief that, by his method of manipulation, the barbaric operation of extracting teeth will become a thing of the past. That will present a condition of affairs greatly to be desired by us all, for I shall hail the day when there will be no teeth to extract as heartily as any one. It is well known that in the practice of many dentists, where their patients give strict attention to their teeth, extraction is of very rare occurrence, except in cases of regulating for children, and for new patients; and if the whole population of the country could be brought under dental care, the prospects are that extraction would in great part be done away with; but at the present time there are not more than twelve per cent. of the population of this city who visit the dentist, and it is probable that, taking the country at large, not over two per cent. give the care of their teeth any consideration at all; showing a wide field for the expansion of the dental profession, before that desired end can be considered accomplished. But there is one point which occurs to me in the present controversy between filling with the electric and mechanical mallets and the Herbst method or hand-pressure, and that is that all consideration for the patient is left out of the discussion; and yet one of the claims made for the Herbst



method is that it spares the shock and consequent prostration to nervous patients. It is not an uncommon thing for patients to come to me for extraction whose mouths present the appearance of considerable work and expense put upon the teeth, and yet they are in a state of utter neglect. The patient will declare that under no circumstances could they be induced to undergo further operation with the electric mallet; that they would rather have every tooth extracted than submit to it again. Of course, we understand there are many stolid temperaments, who can go to sleep under the operation; but for nervous and delicate conditions I think the hand-pressure preferable. At all events, any system or method which leaves out consideration for the patient, and drives him away, must be at fault. I mention this fact as a criticism by the patient which ought to receive attention.

Dr. Bonwill. Dr. Thomas asserts that most of his patients dislike the malleting of gold fillings by any method, and is fair enough to say that they dislike the dental engine as much. Most people dread dental operations, however performed. No wonder that they dislike the mallet and the engine, because but few operators know how to use power instruments intelligently. If I may speak of my own practice, I am gratified to say that it is on the increase, and among intelligent patients. That they do not rebel is evidence that they do not consider themselves tormented beyond reasonable limits by the use of the mallet. Will Dr. Thomas state whether the objections made by patients coming to him were not directed to all mechanical appliances, the drill as well?

Dr. Thomas. Yes.

Dr. Essig. I regret not having had the opportunity of seeing more of Dr. Herbst's clinics. What I saw was an easy approximal filling, from the outer wall. He cut away this wall to gain access. From what I have seen of the method, I do not think it applicable to many cavities.

Dr. James Truman. The paper I read before this society at its last meeting was not strictly speaking a paper on the Herbst method; but, as its title indicated, an essay on rotation as applied to all the forms of metal used in filling. In answer to one point made by the essayist of the evening, permit me to say, I do not regard it as possible that Dr. Herbst could have been ignorant of American modes. Aside from the extended translations and descriptions of everything new reproduced in the German journals, there is the constant exhibition of American tools and appliances at the German depots, and the quarterly visits of agents to all the principal cities. The points in my paper were not fully met in the discussion, and as it was continued to this meeting, you will bear with me while I

briefly review the positions there taken. I called your attention to the fact that, previous to the introduction of the mallet, hand-pressure, both with non-cohesive and cohesive gold, was alone used. At this period, covering many years, there was comparatively little complaint of cervical decay or failure at the walls. Upon the introduction of the mallet the complaint became almost universal that the cervical border could not be preserved from the action of caries. This was ascribed to various causes,—acid secretions, electricity, incompatibility of dentine, etc. None of these explained it, however. I took the position in my essay that the use of the mallet produced cracks in the enamel, and the result must necessarily be imbibition of fluids, followed by fermentation. I could not regard skill in the use of the mallet as a factor exempting from this result, as caries has destroyed the work of the best operators using this instrument. If this be acknowledged, then we must modify our practice and return largely to hand-pressure, or some process that will condense without injury. In rotation I considered we had sufficient force, used in connection with hand-pressure, to condense gold, and endeavored to demonstrate this by samples of work prepared by the use of cohesive foil.

The fact that cracks exist in teeth does not require the proof of microscopic examination. They are visible in the enamel of many teeth on the labial and buccal surfaces; but in these positions are not liable to result injuriously, from the fact that they are subject to constant cleansing. The result must be very different at the cervical border, or on surfaces not so readily kept clean. Histologically speaking, cracks are probably present in all teeth, caused by occlusion and possibly by changes of temperature. All microscopists will, I think, acknowledge this to be true. Wedl, in his "Pathology of the Teeth," illustrates this condition; and I have found them so universally that I am forced to the conclusion that they exercise an important part in the destruction witnessed. Absolute solidity cannot be regarded as the most important feature of a filling. Adaptation to the walls is absolutely essential. If this be accomplished, the center may be very far from solid and yet the tooth be perfectly preserved. This is clearly shown in the old soft foil fillings of thirty or more years ago. Density is desirable for mastication, and I do not wish to be regarded as underrating it; but it must be attained without injury to the walls.

Dr. Bonwill's paper has been largely devoted to the consideration of mallet force, and especially that of power mallets. He evidently regards *solidity* as the most important feature in a filling, and second to this *rapidity of insertion*. He contends that he can pack against walls with oval points, but I cannot understand how this will soften

the force of the sudden impact of the mallet in the least degree. Admitting that this is possible, gold cannot always be packed in this way. Gold freshly prepared may be condensed with smooth points, but the longer it is kept the poorer it will be for this kind of work. It must be surface clean to be cohesive. Dr. Bonwill doubtless accomplishes this, but he is favorably situated to procure gold direct from the manufacturers and freshly made. When we formulate a plan it must take in all the possibilities, and the peculiarities that surround its use. The process, to be worth anything, should be available in any location and under all circumstances. The specimens he exhibits are beautiful, in that they show very perfectly that foil may be packed, then rolled, and finally be returned to the same character of foil from which it originated. They do not, however, demonstrate the density of the gold. Very soft fillings can be rolled out; indeed several layers of gold foil can be, by annealing, made into plate. The molecular structure of metals, with the changes that take place in crystals, is an interesting subject; and especially is this true in gold and silver. We all know the effect of annealing, and the change it produces, and also the marked effect produced by the jar of wear in rendering these brittle. The annealing process has to be gone through with in rolling. The best test for a filling is to attempt to roll it without heating. This I did with the filling made into the small plate and exhibited at the last meeting. I regard this as a more severe test than any presented by Dr. Bonwill this evening.

To show that absolute density is not required to make a plate, I rolled out several of the fillings illustrating my paper, and not regarded by those present at the reading, as dense as could be made by mallet force. These I now present you for examination. You will observe that one weighing  $5\frac{3}{4}$  grains is rolled into a plate  $7\frac{5}{8}$  inches long by  $\frac{1}{4}$  inch in width. This is as far as I could carry it under the rolls. The others I did not extend to the same length, but each shows perfect plates. I then prepared a filling weighing  $\frac{1}{2}$  oz., packing by hand-pressure and rotation, using Abbey's No. 4 cohesive foil. Mr. Abbey very kindly rolled this for me and made a portion of it into foil. This is also exhibited. In this I simply followed Dr. Bonwill, since I had the pleasure of seeing his work shortly after he read this same paper in New York. My aim was to demonstrate that density had little or nothing to do with the result attained by him, and this fact, I think, is fully shown in the specimens presented.

While I do not regard the abandonment of the mallet as advisable, it remains certainly essential that that instrument should be used more intelligently in the future than it has been in the past.



Rotation cannot, I think, be made effective without hand-pressure be connected with it, either as Herbst explains it, or, as I prefer, with sharply serrated pluggers. That the mallet can be effectively used in this connection cannot be doubted; hence it will, probably, not be wholly dispensed with by those adopting this process.

Dr. Bonwill. I am surprised at Prof. Truman's statements, in view of his letter of only a few weeks since acknowledging that the perfection of solidity is attained by the use of the mallet, and that he had no desire to set it aside for the Herbst method. It is too late to claim that no power mallet should be used for fear of injury to the walls of the cavity at the periphery. The advocates of the Herbst method prefer that plan because they consider that they obtain better adaptation to the walls of the cavity with less unpleasantness to the patient. Those who cannot use anything but hand-pressure successfully should continue to use it, but should not expect on that account to banish power instruments from the offices of those who know how to use them. As to the specimens of old gold fillings shown not being a true test of the value of the instruments which impacted it, I would like to see some tests that would surpass it. I have stated that all cohesive gold can be thus tested. Even hand-pressure will solidify it, and so, doubtless, will the rotation method. But no such results were ever attained before with Abbey's old soft foil by any method. Prof. Truman asks why I did not send out the same kind of points with my mallets which I now use, and which I claim will produce the same results as the Herbst method by rubbing the gold as the tool passes rapidly over its surface with a smooth or roughened, but not serrated, slightly oval point. It was not because I wanted to keep my knowledge to myself, and certainly this idea was not derived from Dr. Herbst. The Varney points had taken such hold upon the profession that I have often had instruments returned because they were not perfect copies of Varney's. The trouble was that I could not overcome all prejudice at once, but little by little the profession is accepting my theories as well as my inventions.

Dr. H. C. Register. Encouraged by Dr. Truman's success with the Herbst system, I purchased a set of his instruments and tried them upon a patient of nervous temperament, who could not well bear the mallet; but I regret to say that in my hands the system was not a success. The experience, however, led me to use them in the general manipulation of alloy, and for it alone. I feel greatly indebted to Dr. Herbst for the aid his instruments have given me in packing amalgam. Thoroughly incorporated alloy, and freed from mercury to the fullest extent, can be made soft and pliable by the heat generated by rotation, and its perfect impactment and quick

crystallization made sure. One of the essentials in making a perfect adaptation in all parts of a cavity is in freeing its walls of moisture, by quick or slow desiccation, and bringing the filling into juxtaposition without injury thereto. We are indebted to Dr. Bonwill for the mallets he has introduced. I have used upwards of a half dozen of each of his patterns, but, not feeling satisfied therewith, I have for the past two years been using one of my own construction, the principal novelty of which is a roller inserted in the periphery of the driving-wheel,—or, in other words, a wheel within a wheel, which rolls over the head of the plugger, giving a quick, energetic blow, without any disposition to tip up the instrument at the point of impact.

Dr. Tees. I think the mallet has been of great utility not only to the mass of dentists but to their patients. The cases mentioned of serviceable fillings made of soft foil, by hand-pressure, of very many years' duration, we must not forget, were made by experts. The great majority of operators in those days were unable to make, except in simple cavities, solid and durable fillings. During the first ten years of my practice I was frequently called upon to remove water-soaked fillings resembling Indian-meal mush. Sometimes there were quite a number in the same mouth. Such fillings, no doubt, were formed of ropes, forced into the cavities by means of serrated pluggers, and then rubbed over with a burnisher. At the present time I am constantly inspecting beautiful fillings, contour and otherwise, in many cases coming from the hands of the younger members of the profession, made of cohesive foil, by means of the various mallets.

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#### CHICAGO DENTAL CLUB.

THE Chicago Dental Club held its annual meeting at the Tremont House, Chicago, Ill., on Monday evening, January 24, 1887, when the following officers were elected :

L. P. Haskell, president; John S. Marshall, vice-president; Arthur B. Freeman, secretary; E. M. S. Fernandez, treasurer; Eugene S. Talbot, Austin Freeman, and Charles P. Pruyn, business committee.

ARTHUR B. FREEMAN, *Secretary*,  
No. 325 West Madison street, Chicago.

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#### ODONTOLOGICAL SOCIETY OF WESTERN PENNSYLVANIA.

THE next regular quarterly session of the Odontological Society of Western Pennsylvania will be held at the office of Drs. Libbey Smithfield street and Sixth avenue, Pittsburg, Pa., on Tuesday, March 8, 1887, commencing at 1.30 P. M.

C. V. KRATZER, *Secretary*, Braddock, Pa.

**VERMONT STATE DENTAL SOCIETY AND BOARD OF EXAMINERS.**

THE eleventh annual meeting of The Vermont State Dental Society will be held at the Van Ness House, Burlington, Vt., commencing Wednesday, March 16, 1887, and continuing three days.

Members of the profession at large are cordially invited to attend. An effort will be made to secure free return checks over all the railroads, and reduced rates at the hotels.

THOS. MOUND, *Secretary*, Rutland, Vt.

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The next annual meeting of the Vermont Board of Dental Examiners will be held at the Van Ness House, Burlington, Vt., on Wednesday, March 16, 1887, at 2 o'clock P. M. Those wishing to go before the board for examination will please notify the secretary before that time.

R. M. CHASE, *Secretary*, Bethel, Vt.

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**SOUTHERN ILLINOIS DENTAL SOCIETY—CHANGE OF DATE.**

THE Southern Illinois Dental Society will convene at Duquoin, on the second Tuesday (12th) of April, 1887, instead of the first Tuesday, as before announced. Those contemplating attendance will please note the change. By order of the president and executive committee.

G. W. ENTSMINGER, *Secretary*,  
Carbondale, Ill.

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**ALABAMA DENTAL ASSOCIATION.**

THE regular annual meeting of the Alabama Dental Association will be held at Tuscaloosa, Ala., commencing on the first Tuesday (5th) of April, 1887, the sessions to continue for four days.

All dentists are cordially invited to attend.

The State Board of Dental Examiners will meet at the same time and place.

T. M. ALLEN, D.D.S., *Secretary*,  
Eufaula, Ala.

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**GEORGIA STATE DENTAL SOCIETY.**

THE next annual meeting of the Georgia State Dental Society will be held at Cumberland Island, on the fourth Tuesday in May, 1887, instead of the second, as per adjournment.

L. D. CARPENTER, *Corresponding Secretary*,  
Atlanta, Ga.



**SOUTHERN CALIFORNIA ODONTOLOGICAL SOCIETY.**

THE Southern California Odontological Society will hold its next regular quarterly meeting on Tuesday, April 5, 1887, at the office of Drs. Urmey & Townsend, No. 237 South Spring street, Los Angeles, Cal. Sojourning dentists cordially invited to attend.

E. L. TOWNSEND, D.D.S., *Secretary*,  
Los Angeles, Cal.

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**UNIVERSITY OF MARYLAND—DENTAL DEPARTMENT.**

THE annual commencement exercises of the Dental Department of the University of Maryland for 1887 will be held at the Academy of Music, Baltimore, on the 16th of March, at 12 M. The contest of the graduating class for prizes will take place in the Dental Infirmary, on March 15, commencing at 10 A. M. The commencement of the Dental Department will be held separately from that of the Medical Department.

F. J. S. GORGAS, *Dean*.

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**INTERNATIONAL DENTAL CONGRESS.**

A CONFERENCE of dentists who were in attendance at the eighteenth anniversary of the First District Society of New York was called at the Sturtevant House, to consider the feasibility and advisability of taking steps for the calling of an International Dental Congress at some future date. Thirty-five dentists were in attendance, among whom were Drs. Northrop, Dwinelle, Littig, Walker, Perry, Carr, Kingsley, and Mills, of New York City; Keech, Coyle, Winder, and Waters, of Baltimore; Hunt, of Washington; Darby, Truman, and Peirce, of Philadelphia; Brophy and Harlan, of Chicago; Shumway, of Massachusetts; W. P. Dickinson, of Iowa; Watkins, Meeker, Brown, Levy, and others, of New Jersey; Bartholomew, of Springfield, Mass., and others whose names escaped the secretary.

The meeting was called to order, and elected Dr. W. H. Dwinelle chairman, and Dr. Geo. A. Mills secretary.

Dr. Kingsley opened the discussion by some remarks in which he considered the advisability of taking steps for organizing a meeting to be called an International Dental Congress, and he offered the following resolution:

*Resolved*, That, in the opinion of the conference, the interests of the dental profession throughout the world will be advanced by an International Dental Congress.

A discussion then followed, in which Drs. Northrop, Truman, Brophy, Hunt, Winder, Keech, Kingsley, and the chairman took

part. There was no difference of opinion as to the advisability of holding such a congress at some future time, and the years 1888, 1889, and 1891 were severally suggested and considered. The year 1890 was out of the question, because of another International Medical Congress to be held in that year. As to the time, no decision was reached. The resolution was carried unanimously. A second resolution was offered, viz:

*Resolved*, That the following-named gentlemen constitute a committee of temporary organization, whose duty it shall be to make such a plan for a permanent organization as shall in their estimation best call out universal support.

This was also discussed and carried. The committee named consists of Drs. Dwinelle, Northrop, Walker, Kingsley, Winder, Hunt, Coyle, Brophy, Levy, Meeker, Southworth, Frank French, Truman, Peirce, and Flagg.

A third resolution was offered and carried, viz:

*Resolved*, That this committee be empowered to fill vacancies and enlarge its numbers at their discretion.

This conference was amicable in a large sense, yet there was a free interchange of opinion. While all did not think alike in all things, wise measures were strongly advocated, so that it should not appear that there was any disposition to place obstructions in the way of any movement that sought the best good of all.

The meeting adjourned subject to the call of the chairman.

GEO. A. MILLS, *Secretary of the Conference.*

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## EDITORIAL.

### CONCESSION NOT CONVERSION.

WE somewhat reluctantly give place in this issue to a communication from Dr. N. W. Kingsley,—reluctantly because of the space thus occupied to the displacement of practical matter, and also because of a conviction that no such lengthy explanation was necessary in view of the editorial remarks which in the doctor's opinion justified him in asking a hearing. The claim, however, that his position had been misrepresented required that he must be permitted to speak for himself. The whole context of the sentences to which he takes exception shows that the reference was not to his opinion as to whether dentistry was or was not a specialty of medicine, but to the fact that, having previously been in opposition to the Dental Section of the International Medical Congress, he was now prepared to pledge it sympathy and active support. This seemed to justify

the words "recede," "conversion," "somersault," employed in the editorial referred to.

A single quotation from the authorized reprint of his recent address, and another from the stenographer's report of the remarks at the First District Society's anniversary meeting, will, it would seem, demonstrate the substantial correctness of the language criticised :

"Another issue is being forced upon us, and rapidly approaching a crisis. An International Medical Congress is announced to be held in this country, at Washington, in September, 1887, and dentists are asked to form a Section of that Congress. It would not require a very astute observer to divine from my present discourse what position on such a question I would be likely to take. As an independent profession, we have no business there; as dentists, we are out of place."

"I say to you, gentlemen, who are the officers, and you who form the council and the government of the Section of Dental and Oral Surgery in the International Medical Congress, that we pledge to you our full sympathy, our moral support, and, so far as it is in our power, our active support, until your work is accomplished. \* \* \* Whatever influence I have shall be used to give the whole support of the State Society to the Dental Section of the International Medical Congress, so that it shall be, without any possibility of doubt, a complete success, and creditable to dentistry in America."

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### DENTAL LEGISLATION IN THE COURTS.

THE privileges, duties, rights, limitations, and difficulties of Dental Examining Boards are matters of such general interest to the profession, and are so likely to become the subjects of professional and legal controversy, that there seems to be a necessity for the publication of a history of any judicial rulings growing out of conflicting ideas and actions of those who become plaintiffs and defendants in such cases.

The necessity for such suits and such publication is nevertheless to be deprecated. It is not possible for even a non-partisan to give by brief résumé a record of proceedings which shall fairly represent the true inwardness of the surface indications on both sides.

When judges and juries, with what would seem to be far greater facilities for arriving at the facts than those who do not hear all the evidence can have, hold diverse opinions, the outside world may well afford to wait for the clearer light which will come in due time. Meanwhile, let the grand sentiment of Lincoln prevail—malice towards none; charity for all.

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### THE "AMERICAN SYSTEM OF DENTISTRY."

IN the belief that it could no better serve the interests of the profession at large, and more particularly of its patrons in distant



lands, The S. S. White Dental Manufacturing Co. has accepted the agency for the sale of "The American System of Dentistry" for all the world except the United States, the Dominion of Canada, and Great Britain and Ireland. The countries named will be reached by the publishers through other channels.

This superb work, which has been in preparation for several years, is a comprehensive and exhaustive exposition of dental science and art. The various subjects have been assigned to well-known writers, each of whom was selected for his special knowledge of the topic committed to him. The result of their labors is a vast storehouse of information, rich with treasures garnered from the experience of the whole past of dentistry, a very encyclopedia of the present development of theory and practice in America.

The work consists of three volumes, two of which are now ready for delivery, and the third in press. It can be ordered through the dealers in dentists' supplies or of any of the company's houses. (See advertisement.)

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#### THE RICHMOND CROWN AND BRIDGE-WORK PATENTS.

As our last form goes to press we have a telegram announcing the fact of a decision in the United States Circuit Court adverse to the claims of the International Tooth Crown Company, with the exception of the Low patent, which was sustained.

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#### ADDITIONAL PAGES.

In order to admit matter which it did not seem advisable to delay, we are compelled to add extra pages to this number.

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#### BIBLIOGRAPHICAL.

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THE AMERICAN SYSTEM OF DENTISTRY. In Treatises by Various Authors. Edited by WILBUR F. LITCH, M.D., D.D.S., professor of prosthetic dentistry, therapeutics, and materia medica in the Pennsylvania College of Dental Surgery, Philadelphia. Volume II: Operative and Prosthetic Dentistry. With 1035 illustrations and 3 plates. Royal octavo, pp. 1100 and index. For sale by subscription only. To be completed in three volumes. Price, per volume, cloth, \$6.00; leather, \$7.00; half morocco, gilt top, \$8.00. Philadelphia: Lea Bros. & Co., 1887.

The contents of Volume II are as follows: "The Stopping Process with Gold, and the Related Procedures," by Louis Jack, D.D.S., 188 pages; "The Herbst (German) Method of Filling Teeth," by C.

F. W. Bödecker, D.D.S., M.D.S.N.Y., 11 pages; "Plastic Materials for Filling Teeth," by A. G. Bennett, D.D.S., 38 pages; "Electro-Chemical Relations of Stoppings to the Teeth," by S. B. Palmer, M.D.S., 17 pages; "Calcareous Deposits on the Teeth," by A. W. Harlan, M.D., D.D.S., 20 pages; "Discolored Teeth and their Treatment," by James Truman, D.D.S., 12 pages; "Orthodontia," by S. H. Guilford, A.M., D.D.S., 54 pages; "Replantation and Transplantation of the Teeth," by George W. Weld, M.D., D.D.S., 25 pages; "Extraction of Teeth," by Thomas C. Stellwagen, M.A., M.D., D.D.S., 64 pages; "Taking Impressions of the Mouth," "Plaster Models," "Antagonizing and Contour Models," by A. G. Bennett, D.D.S., 33 pages; "The Geometrical and Mechanical Laws of the Articulation of the Human Teeth,—the Anatomical Articulator," by W. G. A. Bonwill, D.D.S., 13 pages; "Metallic Dies and Counter-Dies," by William H. Trueman, D.D.S., 21 pages; "Artificial Dentures on Bases of Gold and Silver," by William H. Trueman, D.D.S., 139 pages; "Artificial Dentures of Enameled Platinum (Continuous-Gum Work)," by D. D. Smith, M.D., D.D.S., 23 pages; "Artificial Dentures on Bases of Fusible Alloys," by Theodore F. Chupein, D.D.S., 12 pages; "Artificial Dentures on the Rubber Base," by Alonzo P. Beale, D.D.S., 39 pages; "Celluloid and Zylonite," by W. W. Evans, M.D., D.D.S., 25 pages; "Artificial Crowns (Pivot Teeth)," by William H. Trueman, D.D.S., 53 pages; "A System of an All-Porcelain Crown Substitution," by W. G. A. Bonwill, D.D.S., 18 pages; "Crown and Bridge-Work," by Wilbur F. Litch, M.D., D.D.S., 118 pages; "Metallic Facings for Carious Crowns," by Wilbur F. Litch, M.D., D.D.S., 8 pages; "Moulding and Carving Porcelain Teeth," by William R. Hall, D.D.S., 60 pages; "The Hygienic Relations of Artificial Dentures," by Edward C. Kirk, D.D.S., 12 pages; "Dental and Facial Types," by Robert S. Ivy, D.D.S., 23 pages; "Obturators and Artificial Vela," by Henry A. Baker, D.D.S., 48 pages.

We have neither the time nor the inclination to criticise minor matters, about which there is a diversity of opinion which will always continue to exist. For instance, it might be said that Dr. Jack's essay was not as encyclopedic in character as it might have been made; in other words, that he had not discussed many methods differing from his own and held in high esteem by eminent operators; that he has given chiefly his own methods. But to have made even brief notice of the theories and arguments of all who hold pronounced opinions about operative procedures would have occupied more space than could have been accorded to any one writer, according to the plan of the work. What he has done is to present a systematic and orderly, terse and yet comprehensive, description

of the stopping process with gold, from the examination of the teeth to the completed work, including preparation of cavities, the treatment of sensibility, separations, pulp exposure, devitalization; properties and varieties of gold foil, its preparation for use, packing by hand-pressure, by malleting, by automatic, mechanical, and electric mallets; the use of the matrix, the inlaying of porcelain, the finishing of fillings, the instruments adapted for all the various processes described, the treatment of the teeth of children, the hygienic care of the teeth, etc. We observe with regret that Dr. Jack has left an open door which we would have been glad to have had the force of his influence in closing. He is careful to condemn the use of arsenious acid for the treatment of sensibility of dentine except as "a last resort, with the most extreme caution, and only by those who are well acquainted with the character of this substance, with its mode of action, and with the means of its employment." We would have preferred if, instead of this careful discrimination, the author had expressed absolute and utter condemnation of this agent for the treatment of sensibility. But he seems to have labored honestly and earnestly to impart to his readers from his stand-point all communicable knowledge essential to the practice of that department of dentistry of which he writes, and has in our estimation succeeded in producing the best monograph upon that subject which has yet been written.

In "Orthodontia" Dr. Guilford has succeeded in condensing into fifty-four pages the most prominent features of regulating, while his essay is rendered of conspicuous importance to the practitioner by the generous use of illustrations; and Dr. Stellwagen's paper on "Extraction" is another instance of quite exhaustive illustration and treatment. Dr. William H. Trueman's several contributions on "Bases," "Artificial Crowns," etc., cover over two hundred pages of the volume. Dr. Litch's essay on "Crown and Bridge-work" is certainly of great value, combining all that text and engraving can do to set before the profession this important phase of modern practice.

We would like, if space permitted, to write at considerable length of several of the other chapters in the volume. So far as we have had opportunity to examine them, they form a series of monographs on the several subjects indicated in their titles which will serve as reliable guides in practice, and he must be indeed a well-informed man who will not find the full value of the three volumes constituting this "System" in each of several of the essays in the first and second volumes, to say nothing of the third, which promises in many respects to equal if not surpass the value of the first two.

Professor Litch merits praise for faithful, judicious, and appreciative editorial work in the production of these two instalments of



the great undertaking which will reflect lasting honor upon him.

We point with no small satisfaction to the large use made in these volumes of the drawings illustrating every department of dental practice which were originally employed in the *DENTAL COSMOS*, and which with scrupulous care have been credited to their source. Thus brought together in comparison and contrast, they will be easy of reference, and perpetuate in the dentist's library their educational value.

**THE MICROSCOPIC STRUCTURE OF A HUMAN TOOTH.** Together with some Unusual and Irregular Forms of Teeth. By C. H. STOWELL, M.D., F.R.M.S., professor of histology and microscopy in the University of Michigan. Ann Arbor, Mich.: Charles H. Stowell, 1887.

This is a handsome work in the style of illustrated art publications, of portfolio dimensions. It is printed on fine, heavy paper, and the plates, of which there are twelve, are mounted on muslin guards. The illustrations are well executed, and on a scale sufficiently large to make the delineation of structural characteristics very distinct. The illustrations were all drawn in India-ink by the author, and reproduced by the engraver in such a manner that the former holds himself responsible for their accuracy. Appended is a condensed historical résumé of the progress of dental microscopy, followed by a description of the microscopic structure of a human tooth, including the dentine, dentinal canals, dentinal sheath, dentinal fibers, the granular layer, the interglobular substance, vaso-dentine, osteo-dentine, and dentine of repair; cuticula, enamel, cement, pulp, odontoblasts, and lymphatics; with directions as to methods of examining.

The professional style, tone, and character of the work is to be highly commended, and whether the opinions held by the author are accepted or not, it cannot but prove useful to the student of histology.

The price is six dollars; sold by subscription only. C. W. Arnold, of Detroit, Michigan, is general agent, and applications for agencies should be addressed to him.

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## OBITUARY.

### JOEL P. ULREY, D.D.S.

DIED, at Rising Sun, Ind., November 9, 1886, Dr. JOEL P. ULREY, in the seventieth year of his age.

Dr. Ulrey was born in Lebanon, Warren county, Ohio, May, 1817. He began the study of dentistry in 1836; was one of the organizers of the Ohio College of Dental Surgery, and received his degree from that institution. He was one of the organizers of the Mississippi Valley Dental Society, and was present at the meetings of

that body for about forty successive years. He practiced dentistry for about fifty years, during the last forty of which he was located at Rising Sun.

Dr. Ulrey was held in high esteem by all who know him as a man of unquestioned integrity,—upright in all the relations of life.

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### JOHN B. BELISARIO.

DIED, at Philadelphia, Pa., February 11, 1887, of acute nephritis, JOHN B. BELISARIO, in the twenty-second year of his age.

Mr. Belisario was the son of Dr. John Belisario, of Sydney, New South Wales, a highly respected practitioner of dentistry.

He was a student of dentistry at the University of Pennsylvania, and would have graduated at the coming commencement with high honor had he lived. He was a young man of a very quiet, retiring disposition, and had endeared himself to his professors and classmates by his uniform gentleness and amiability. He was a close student, and bade fair to have ranked high in the profession of his choice. His untimely decease, after an illness of but a few days, was a startling event to his classmates and friends, and his death is sincerely deplored by all with whom he had been brought into personal relations.

At a special meeting of the joint classes of '87 and '88, Dental Department, University of Pennsylvania, resolutions were adopted deploring his loss, stating that by his personal attainments he had done honor to the class of which he was one of the best members, and tendering heartfelt sympathy to the bereaved family.

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### SAMUEL A. McDOWELL, D.D.S.

On the third of January, 1887, as briefly noted in the last number of the DENTAL COSMOS, DR. SAMUEL A. McDOWELL passed to his rest and reward from the ranks of his profession and a place of highest esteem with all who knew him well enough to appreciate his exalted character and devotion to his chosen work.

Born October 20, 1828, in Cumberland county, Pa., he began the study of dentistry with Dr. J. C. Loomis, of Carlisle, graduating from the Baltimore College of Dental Surgery in 1853. Of delicate physique, it was feared his zeal and conscientious devotion would fail of their otherwise sure and legitimate reward by a permanent loss of health, or premature death.

First located at Toledo, Ohio, considerations of health soon induced him to remove to North Carolina. While here he married Miss Hester M. McClellan, of Carlisle, whose loving care and con-

stant watchful devotion contributed as much, as human agency could toward securing and maintaining a fair degree of health.

On the breaking out of the Civil War he returned to Pennsylvania, and, going to Europe in 1863, settled in Basel, Switzerland. His health proving unequal to his rapidly increasing practice, improvement was sought in travel, change, and rest. After some experience with the climate of England and Southern Europe, he settled in 1872 at Frankfort-on-the-Main, where he remained till forced to retire from the effects of overwork, October, 1882. While in this last field he became widely known for his most excellent judgment and skill, and for gentle, patient, self-sacrificing consideration for all whom he treated. Unambitious of financial results, no man ever more truly laid down his life in the interests of those whom his profession called him to serve.

Stricken by paralysis a year after his retirement, he sufficiently recovered to enjoy comfortable general health till a recurrence of similar nature terminated this life of preëminently noble self-sacrifice. The whole profession may well unite in sympathy with the beloved wife and friends, mourning the loss of one whose life and character so exalted and adorned our calling. E. P. GEORGE.

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## HINTS AND QUERIES.

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**TOOTH IMPLANTATION.**—The probability of permanence for teeth implanted on the Younger plan will in great degree depend upon the manner in which the operation shall have been performed, and especially upon the observance of some essential preliminary conditions; the formation of a socket in exact conformation to the root of the tooth; the maintenance of the tooth at an equable temperature, and the absolute sterilization of both tooth and socket.

Since the implantation of a superior second bicuspid for a young lady, by Dr. Younger, in my office, I have repeated the operation in several cases, which, like that of Dr. Younger, have up to this time proven entirely satisfactory. In certain details of procedure I have diverged from the method then pursued by its originator, and, as at this stage of the novelty the several steps in the operation are of necessity in the nature of experiments, it may not be amiss to describe the process with some minuteness.

The prime difficulty in every case is the obtaining of a suitable tooth. With that in hand, the pulp chamber is entered from the apical foramen with a very fine drill, and, with a slightly tapering reamer, the canal is enlarged to the full depth. After thoroughly removing all the pulp, the chamber and canal are then tightly packed with warmed gutta-percha pellets, which by reason of the tapering walls may be driven in to hermetically fill the cavity. When the filling reaches to within one-eighth of an inch of the apex, the remaining portion of the canal is filled with gold. The filling and the foraminal end receive as fine a finish and polish as can be given them, and the tooth is then submerged in an aqueous solution of mercuric chloride, 1 to 1000, at a temperature of 105° F. The illus-



tration, Fig. 1, exhibits in detail the apparatus I have contrived for the purpose of containing and maintaining the several fluids required at a constant temperature, and this is effected by means of the thermostat, of which Fig. 2 is a vertical section. The gas enters by an upper inlet, and through the little aper-

FIG. 1.

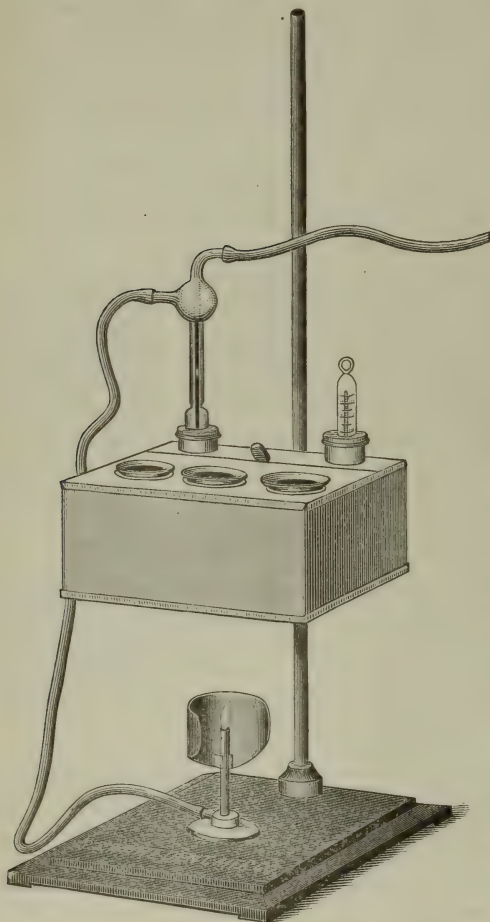
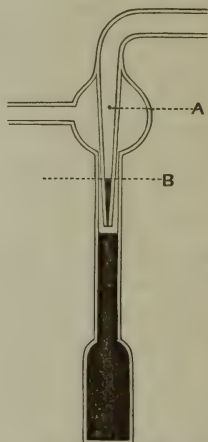


FIG. 2.



ture, A, escapes into the outlet chamber, while the main stream flows down the tube to its slotted end, and thence flows back between the tube and its case to the outlet chamber, and through the outlet to the burner. The case reservoir is filled with mercury to a point just below the end of the inlet tube. It is obvious that if heat should be applied to the reservoir, the mercury would expand until it should surround this tube, and, rising gradually, shut off the flow of gas through the slot until at B the current would be quite cut off and only the little branch

stream flowing through A continue to supply just enough gas to keep the burner alight. In Fig. 1 the inlet and outlet tubes are seen connected with the thermostat, the reservoir of which is immersed in the water of the bath, in which is also immersed a thermometer. In front of these the half cover of the bath is hinged, and holds three small glass beakers, which are likewise immersed in the water of the bath. The cover may thus be lifted for filling the bath or for discovering the depth of the water at will, and yet the beakers need not be displaced. For use the first beaker is nearly filled with distilled water, the second with  $\text{HgCl}_2$  solution, 1 to 500, and the third with the solution of  $\text{HgCl}_2$ , one part to the

one thousand of water. The bath is adjustable on the stand, and will usually be set one-half higher than shown in the cut. By these means one has at hand throughout the entire time of the operation pure tepid water for use with the syringe, a sterilizing solution in which the instruments may be repeatedly dipped, if desired, and the sterilizing solution in which the tooth is kept during the successive preparatory steps of the operation.

At the outset it is important to make a small linear incision in the direction of the ridge and dissect the gum away, so that in the preliminary boring with a trephine, or, as I prefer, a suitable spear drill, the flaps of the gum shall not be cut away, for they are subsequently useful in forming a proper gingival margin around the tooth. With a suitable safe-ended reamer, or better the spiral knife of Rollins, the hole is to be quickly enlarged laterally, so that the often tried in tooth (which is only for an instant kept out of the mercuric chloride solution) shall at last stand in normal relations to its fellows and the occluding teeth. When such adjustment has been made, the artificial socket should be well washed out with the tepid water, followed by a thorough wiping out with a roll of cotton-wool on the end of an instrument, and saturated with the sterilizing fluid, 1 to 500. The tooth is then put at once in place, where if necessary it is to be secured by silk ligatures so tied around the adjacent teeth that the implanted tooth shall be as little liable to movement as possible. In from ten days to two weeks, if all has gone well, the ligatures may be removed and the tooth left to time and care for fixation in its new home. In some cases, when extremely good adaptation of the tooth to the artificial socket has been obtained, the mechanical coaptation has been so nearly perfect that I have dispensed with the ligature as unnecessary.

The desired temperature (about 105° F.) is maintained automatically by means of the thermostat, and the thermometer serves as a check. The use of the apparatus leaves the operator free to give his entire attention to the operative procedure, without giving valuable time or care to many details which would ordinarily require his services or those of an intelligent assistant. The instruments intended for the operation of implantation should be used for that purpose only, and kept scrupulously clean. After each operation, and immediately before another one is performed, they should be placed in a suitable vessel and subjected to the action of boiling water for some minutes, which will completely sterilize them. Their occasional immersion in the mercuric chloride solution is an additional safeguard which should not be neglected.—EDWARD C. KIRK, D.D.S., Philadelphia, Pa.

**COCAINE NERVE PASTE.**—I have been using for the past two months an arsenical preparation for devitalizing dental pulps composed as follows: *R.*—Acid. arsenios. pulv., cocaine hydrochlorat, *ãã* gr. xx; menthol cryst., gr. v; glycerina, q. s. to make a stiff paste.

The formula which I have been in the habit of using until I adopted the foregoing was the ordinary preparation composed of equal parts of arsenious acid and morphia acetate made into a paste with creasote. This I found to be quite irregular in its action, especially so of late, frequently causing attacks of violent odontalgia when an application was made for the purpose of devitalization. The paste made with cocaine according to the formula given I find to be entirely free from the objectionable features of the ordinary nerve paste, and its application has in no case as yet caused pain, while it is fully as active as the old preparation. I have applied it indiscriminately to inflamed pulps as well as to those which were not, and its action is that of a prompt obtundent, giving almost immediate relief from the pain of an aching pulp. The uniform satisfaction which I have had in its

use has induced me to publish the formula for the benefit of those who may have had difficulty in the use of other devitalizing preparations.—E. C. KIRK, D.D.S.

**MECHANICAL REMOVAL OF AN ARTIFICIAL DENTURE FROM THE ESOPHAGUS.**—In the January number of the DENTAL COSMOS there is a report of the accidental passage of a partial upper denture into the esophagus, for the removal of which esophagotomy was performed. This case reminded me of a similar one that occurred some months ago, a report of which is appended.

Charles M., aged forty years, residing in Monmouth county, N. J., in August, 1886, while in the act of drinking beer from a bottle, swallowed a small partial superior denture, to which had been attached the two superior centrals, but which had been lost off. The plate was carried into the esophagus, lodging about on a level with the cricoid cartilage. Almost immediately vomiting with violent retching occurred; respiration was materially interfered with; deglutition was rendered impossible, and the pain was intense.

The patient applied for relief to a physician, who made several attempts to remove it, but failed. He then tried the efficacy of an emetic, but with no better result. The following morning another effort to remove the plate was made, which also failing, the patient was taken some twelve miles distant for the assistance of another physician. He was at the time exceedingly anxious and frightened about his condition; the irritation had resulted in complete loss of voice, retching and vomiting occurring at intervals; any attempt at an examination was followed by increased pain and coughing.

An extemporized bristle probang was constructed as follows: An elastic catheter, number twelve, with about two inches of the smallest extremity cut off, and a small steel wire passed through it, projecting about two inches beyond the end, was employed. A number of bristles were then taken from an ordinary white-wash-brush, and securely tied at one end upon the extremity of the projecting wire, and at the other end upon the catheter, in such a manner that when the wire was drawn backward through the catheter the two ends of the bristles would be made to approach each other, causing them to bulge in the center. When pushed forward again the bristles would straighten. The patient was etherized. With the wire projecting sufficiently to keep the bristles taut, this instrument was passed into the esophagus, and beyond the obstruction, but not without extreme difficulty, as it very nearly filled the passage. When it had passed beyond the plate the wire was drawn backward through the catheter, causing the bristle to bulge as before described. With this the denture was easily removed. Only a slight hemorrhage followed.—WILLIAM E. TRUEX, D.D.S., Freehold, N. J.

SEEING in the February number of the DENTAL COSMOS an account of "Caries in the Mastodon," reminds me that in the museum at Salem I was shown the tooth of a sperm-whale with an immense carious cavity reaching to and badly exposing the pulp. The old sailor who acted as cicerone said he had no doubt that the furiously mad condition in which these animals are sometimes found was caused by the toothache.—T. H. C., Boston, Mass.

IN reply to Dr. Jas. W. Cormany, in the February number of the DENTAL COSMOS, I will say that I have a south light. The window is six feet wide, and I regulate the light by having two white shades each covering half of the window. In the morning, if the sunlight is too strong, I draw down the one at the left; in the afternoon the one at the right. I also have a darker shade to cover the whole window. I find this answers very nicely.—F. A. GREENE, Geneva, N. Y.



## THE INTERNATIONAL TOOTH CROWN COMPANY.

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### DECISION OF THE COURT.

THE general interest felt throughout the country in the protracted litigation of the Richmond patents has induced us, after the last form of this number of the DENTAL COSMOS had been put to press, to withhold its issue until the following abstract, giving the substance of the decision as to the four patents alleged to be infringed, could be put in type for the information of our readers. It becomes all who propose the insertion of dental substitutes by any of the methods which have come to be known as bridge-work to understand the various questions discussed and adjudicated.

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UNITED STATES CIRCUIT COURT, SOUTHERN DISTRICT OF NEW YORK.

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THE INTERNATIONAL TOOTH CROWN COMPANY

vs.

RICHMOND ET AL.

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(BEFORE WALLACE AND SHIPMAN, JJ.)

WALLACE, J.

The complainant is the owner of four patents relating to improvements in the dental art, all of which are alleged to be infringed by the defendants. This suit is brought for an injunction and accounting.

The first of the patents in suit was granted to James E. Low, March 15, 1881, upon an application filed December 20, 1880. The subject is an improvement in dentistry whereby artificial dental surfaces may be permanently fixed in the mouth in place of lost teeth without the use of plates or other means of deriving support from the gum beneath the artificial denture. The patentee refers in his specification to the preëxisting state of the art.

[A part of the patent is then quoted and the Judge proceeds:]

It is entirely clear that the invention described in the patent was not only new and useful, but was an improvement in the dental art of considerable merit.

The former methods of supporting artificial teeth referred to in the patent were not designed to secure a permanent attachment of the artificial tooth to the natural teeth, but were intended to secure a removable attachment, the theory of many dentists being that a rigid attachment was undesirable and impracticable as uncleanly and also as liable to produce inflammation of the natural teeth. The methods which had been employed to secure a permanent or rigid attachment of the artificial to the natural teeth were well calculated to excite the distrust and opposition of intelligent dentists. One of these is described in an article of which W. H. H. Eliot was the author, published in March, 1844, in "The American Journal of Dental Science." This describes an artificial denture consisting of three teeth fastened upon a backing of metal. The extreme teeth, or the ones at each end of the artificial denture, are provided each with a pin.

These pins are to go into holes drilled in the prepared roots of natural teeth, and in this way the denture is to be held in place. A slight bearing surface is formed by plates which are to bear upon the smooth ends of the natural roots remaining in the gum. This denture simply consists of teeth held in by pivots and connected by a bar, or backing of metal. Another of these methods is described in the United States patent to Benjamin J. Bing, of January 23, 1871. This method consists in attaching artificial bars, which bars at either end are to be secured to natural teeth by forming cavities in the natural teeth, inserting the ends of the bars in the cavities, and then filling the cavities with gold.

The objection to the use of plates or other methods of supporting the artificial tooth by the gum are sufficiently pointed out in the patent, and the objections to methods like those of Eliot and Bing for supporting the artificial teeth by a permanent attachment to natural teeth or the roots of such teeth are obvious. Where pivots are inserted in the teeth to secure a rigid attachment, as in the Eliot method, they become loosened in the process of mastication, and the teeth are liable to be split by sidewise wrench or motion. Such methods as Bing's tend to the destruction of the adjacent natural teeth, the strain and motion in mastication loosening the metal fillings, and requiring a re-attachment of the denture from time to time, to the increasing injury of the natural teeth.

By the method of the patent a plate is dispensed with when some natural teeth remain, and instead of the artificial teeth being loosely clasped to the adjacent natural teeth, they are attached with strength and permanency, and are not forced into contact with the gum during the strain of mastication. By being firmly fixed upon bands of metal, secured rigidly and permanently by cement, or otherwise, upon the adjacent natural teeth which they surround, the denture has an easy and efficient bearing, the gum escapes injury, and the strain of mastication is transferred to the natural teeth. When the natural teeth employed have their surface adjacent to the gum cut away at the back, and only descend to contact with the gum along the front edge, another advantage results; because the small area covered by the bases of the teeth precludes such an accumulation of food or other foreign matter between the gum and the denture as cannot be readily removed. It is not contested that Low was the first to devise and perfect the improvement described in the patent; but it is urged that in view of the prior state of the art, as described by the publications referred to, and as also described by the publications of Lintott, Scott, Fowell, and others, the improvement of Low did not involve invention. The references to the publications of Lintott, Scott, and Fowell are not of sufficient importance to require comment. Undoubtedly Low was materially assisted in perfecting his invention by his observations of the artificial crown of Dr. Richmond, and it is not unlikely that the invention derives its chief value from its adaptability to use with the Richmond crown. It may not have involved a high order of inventive faculty to work out the conception by connecting such crowns by a bar or bridge bearing an artificial tooth or teeth. Nevertheless, the fact remains that Dr. Low was the first to accomplish successfully what skilled dentists like Dr. Rich did not believe to be practicable, and to demonstrate how the objections which were supposed to be so serious to the method of rigid attachment could be obviated. It is not difficult after the fact to show by argument how simple the achievement was, and by aggregating all the failures of others to point out the plain and easy road to success. This is the wisdom after the event that often confutes invention and levels it to the plane of mere mechanical skill. The ingenious argument in this case has not satisfied us that there was no invention in the improvement of Low.

The defence is relied on that the invention had been in public use for more than two years before the application for the patent. The proofs show that operations were performed by Low during the latter part of the year 1877 in which he inserted the dentures of the patent in the mouths of patients. As the application upon which the patent was granted was not filed until December 20, 1880, the defence would be established were it not for the fact that Low had made an application which was filed in the Patent Office January 6, 1879, which had never been abandoned, for substantially the same invention. That application contained some matters foreign to the subject of the second application, but so far as it related to the inventions covered by the claims of the patent it did not differ from the second application except in a single particular. The specification of the patent states that non-contact of the artificial tooth or denture carried by the bridge with the gum, or the absence of pressure upon the gum, is one of the advantages of the invention; while it was stated in the first application to be necessary "to carefully fit the base of the tooth or block to be inserted to the jaw, and when secured it should be so pressed down as to leave no space beneath it for the admission of food." The statement in the first application is not inconsistent with the method of the patent, which consists in attaching the artificial tooth or the denture to bands, and supporting them by the adjoining permanent teeth "without dependence upon the gum beneath." So long as this essential feature of the invention is retained it is quite immaterial whether the artificial denture "is so pressed down as to leave no space beneath it for the admission of food," in the language of the specification, or whether it is in positive non-contact with the gum. When the artificial denture is in non-contact with the gum cleanliness is facilitated, and the suggestion which was first made in the second application was therefore a useful one. But it did not change the invention in essentials. Although the tooth or denture is pressed down so close to the jaw that food cannot lodge between it and the gum, it is still supported by the adjacent tooth or teeth, and not by the gum. As was stated in the first application, "the yielding surface on which it rests will readily conform to the tooth or block, and any pain at first induced by the pressure will disappear."

There is nothing to indicate that Low intended to abandon his first application. His application was refused, correspondence ensued with the Patent Office, and finally Low made a personal visit to the office, had an interview with the Examiner, and convinced the Examiner that the invention which was the subject of the application was meritorious and novel, and one for which he was entitled to a patent. During the controversy with the Patent Office various interpolations had been made in the first application, and the Examiner suggested that Low had better make a new application, and thereupon the second application was drawn up. So far as relates to the present invention, the new application differed from the first merely in omitting some superfluous matters, and in changing the description in reference to the character of the contact between the denture and the gum. There was no act on the part of Low which was equivalent to a withdrawal of his first application or to an acquiescence in its rejection. He merely made a new application as a more convenient way of presenting the original application for the final action of the office, after he had been assured that the rejection of his first application would



be considered and a patent would be granted for the present invention. Both applications are to be considered as parts of one continuous proceeding, and the two years within which the invention could not be publicly used without invalidating the patent did not begin to run until January 9, 1879. *Godfrey vs. Eames*, 1 Wall, 317; *Smith vs. Goodyear Co.*, 93 U. S., 500; *Graham vs. Geneva Lake Co.*, 11 Fed., 138.

The second claim includes with the elements of the first claim the features of a tooth cut away at the back. Thus construed the defendants infringe both claims of this patent.

The next patent in suit which may be most conveniently considered is No. 277,941, granted May 22, 1883, to Cassius M. Richmond, assignor, etc. The application for this patent was filed December 1, 1882. This patent is for the invention known in the dental profession as the Richmond Tooth Crown. A patent was granted to Richmond dated February 10, 1880, for an artificial tooth crown, and the present invention is said to be for an improvement upon the tooth crown therein described, but it is in fact for a radically different tooth crown. The invention relates to an improved method or device for attaching such crown to the roots of stumps of natural teeth remaining in the mouth, the object being to provide an artificial crown of improved construction to be adjusted and secured to the root of the natural tooth in a permanent, practical, artistic manner, so that the tooth when finished will present a natural appearance and be capable of the same service as a sound natural tooth. After the natural root or stump has been cut off or ground preferably on a level with the gum, and a hole is drilled therein into which a pin is to be subsequently inserted, a metallic ferrule is then fitted upon and shaped to the prepared root of the tooth. A suitable crown is then selected to be applied to the root,—color, size, and shape being consulted in order to make it conform in appearance to and as a substitute for a natural tooth. The artificial crown is provided with a metallic back or attachment, which has holes through it to allow the passage of the pins, which are firmly imbedded into porcelain. The root and crown having been so prepared, the crown is placed in position and attached to the ferrule by wax sufficiently to hold the crown firmly in position to allow of the removal of the ferrule. Then a suitable pin, designed to be inserted in the hole drilled in the root, is imbedded in the wax. The prepared crown is then invested or protected by a suitable cover of marble-dust and plaster, leaving the wax portion exposed. This investiture will hold the parts in the position which they are to occupy in the mouth. The wax is then melted from the pin and crown, and replaced by a suitable gold solder, which may be blown in a blowpipe and fused around the pin. This solder will unite with the pin extending into the root, the ferrule, the pin extending into the porcelain, and the porcelain backing, making a solid backing to the crown and firmly holding all the parts together. The prepared crown is then slipped upon the prepared root and cemented thereon, the ferrule when placed in position projecting along the very margin of the gum sufficiently to protect the root from decay and to conceal the ferrule from view.

[The patent is then quoted from and the opinion proceeds:]

It is not open to doubt that this patent describes an invention in dentistry of the greatest utility and value. The invention enables an artificial tooth to be placed upon a natural root which can only be distinguished from the natural tooth by the most critical examination, which is as serviceable while it lasts as a natural tooth, and which is very durable. The Richmond crown not only supplies the place of a natural tooth for the purposes of use so as to be a perfect substitute for a lost tooth, but it can be so artistically made as in any instance to be an improvement in appearance upon the natural tooth. Nevertheless, if the patent can be sustained as valid to any extent, it can only be upheld by placing a very narrow limitation upon the claims.

Without referring at present to the state of the art at the time Dr. Richmond conceived the inventions of the patent in 1880, and of the present patent, it suffices to say that everything which is the subject of the 4th, 5th, and 6th claims of the present patent had been in prior public use for more than two years prior to the application for the patent, and was public property prior to the year 1880; and if the remaining claims are valid it is only because an inclosing cap by which the end of the root is hermetically sealed and thus protected from the action of the fluids of the mouth is an element of each claim. The inventor himself had abandoned all the rest of his invention to the public. As early as in December, 1876, Dr. Richmond had inserted a denture in the mouth of a patient in San Francisco, involving the principle of the patent. That denture differed from the artificial tooth crown of the patent only because the inclosing ferrule or band was not a cap which covered the end of the root, and did not extend so far under the gum of the patient as to wholly conceal the gold surface. The denture as then inserted by him was a complete practical success, and so far as is known still remains in use in the mouth of the patient. In the years 1878 and 1879 Dr. Richmond practiced the invention extensively in many of the large cities of the United States, and demonstrated to hundreds of dentists in public clinics and private practice the method of preparing and inserting his artificial tooth crowns. The method was practiced with differences of detail, but was always the same in essentials. The root was always prepared in the way pointed out in the patent, and the denture always consisted of a ferrule or band accurately fitted to surround the root, to which was soldered a crown with a porcelain front having a pin extending into the root, the whole being cemented on the root in one piece. Sometimes a loose floor of platinum or gold was packed inside the band behind the backing of the porcelain front, so as to make a floor above the solder when the crown was invested in position and the solder blown in; and sometimes instead of a loose floor a half floor was joined to the band extending partly over the end of the root, forming a cap embracing part of the exposed end of the root, and the solder was then blown in under the cap. When made in either of those ways the denture consisted of a porcelain tooth attached to a ring of gold at its upper part, and where the porcelain itself met the ring there was no solid floor to the ring, but the porcelain itself impinged upon the ring.

Among those to whom Dr. Richmond taught the invention was Dr. Gaylord, a dentist, one of the defendants in this cause. Two original dentures made by Dr. Gaylord and inserted in the mouths of patients, one in April, 1879, and the other in May, 1879, have been produced in evidence and identified, and the fact that these tooth crowns were made and inserted at those dates and were practical and successful operations, and that with a single exception both were in all respects the tooth crowns of the patent, inserted according to the method of the patent, is clearly established. It is conceded by the expert for the complainant that, if these dentures had been made with a ring or ferrule having a complete floor embracing the exposed end of the root, they would be the tooth crowns of the patent. One of them has a half floor of platinum back of the porcelain under the ring, intended to partially inclose the exposed end of the root, and the other has a partial floor made of loose gold foil stuffed behind the porcelain before the solder was flowed through the back of the crown. It is insisted that when the crown is constructed in this way it



does not have the inclosed cap of the patent, and consequently the end of the root is not hermetically sealed. The controversy as to this patent is thus narrowed down to the question whether the substitution of a complete floor over the end of the natural root, in the place of a partial floor, involves a sufficient invention to sustain the patent.

It is to be observed that in one sense the end of the root is hermetically sealed according to the method of the patent, whether covered with the closed cap or not. The specification states that the prepared crown is slipped upon the prepared root and cemented thereto. As the invention was practiced by Dr. Richmond from 1876, enough cement was placed inside the recess of the prepared crown to exude at the margin of the gum when the crown was forced on the root, to fill up the space, and to make a solid contact, when hard, between the root at all the parts exposed and the crown beneath and the ring surrounding the root. The cement not only serves to hold the crown firmly in its place upon the root, but forms a hermetically sealed inclosure of the root. But it is insisted by the experts for the complainant, and by some of the witnesses who have applied the invention practically, that unless the ring has a solid metallic floor the porcelain where it joins the ring cannot be so closely united that the juices of the mouth will not enter at the joint; that the solder flowed in behind the porcelain will not effectually close this joint; and that in consequence the cement inclosing the root will soon be dissolved and destroyed by the secretions of the mouth. It is alleged that if the minutest hole or perforation is left in the floor of the inclosing cap the cement is exposed to the secretions; that the secretions of different mouths vary wonderfully in their destructive action, and that while in some cases the cement might resist for years, in others it would fail speedily; and thus that the practical value of the invention depends most materially upon the inclosing cap.

Inasmuch as Dr. Richmond had for years been practicing the invention without a closed cap, and introducing his artificial crown everywhere to the profession as a perfect substitute when inserted upon a natural root for the natural tooth, it may be doubted whether the mechanical change of covering the ring with a solid floor, thereby converting it into a cap, was introduced by him so much for its utility as it was for the purpose of suggesting novelty, and enabling him and those with whom he had been engaged to obtain a patent. The change was not made until others had become pecuniarily interested with Dr. Richmond in his invention. Then it was suggested that the reason of the failure of several crowns which had been inserted for patients was that they were defective because they were open at the end of the cap inclosing the end of the root at the point where the porcelain came in contact with the cap. Thereupon the closed cap was adopted. No experiments were apparently necessary, but the defect was remedied as soon as it was suggested. It is testified that the effect of this change was greatly to increase the strength of the artificial crown, and assist in protecting the root from the leverage of the pin by lateral pressure, as well also as to protect more efficiently the cement from the action of the secretions of the mouth. On the other hand, the testimony indicates that since the closed cap has been adopted it is not exclusively used by those who are authorized to practice the invention under the patentees. And although it is perhaps generally preferred, the impression left by the proofs is that there is considerable exaggeration in the opinion that attributes to the closed cap the peculiar efficacy which has been assigned to it.

If Dr. Richmond had been the first to make a closed cap for a use cognate to that to which it was applied by him, the question whether there was any invention in making the change might be resolved in favor of the complainant. But it was not new in the art to use a closed cap in order to hermetically inclose the root of a tooth. This sufficiently appears by reference to a publication in the "Missouri Dental Journal" in 1869 of the operation of Dr. Morrison. That publication describes an operation in which a gold cap is fitted upon the root of a lost or decayed tooth, so as to be adjusted accurately to the remaining portions of the tooth and made to correspond in configuration with the original tooth. The cap is filled with thin paste of cement and pressed to its place upon the root, the superfluous cement being crowded out at the margin of the gum where the cap extends quite to the alveolus. Another instance of the use of the caps having a tight metal floor to be inserted on the natural roots of teeth, and having a porcelain tooth crown soldered on the cap, is disclosed in the patent granted February 3, 1881, to John B. Beers, for an improvement in artificial crowns for teeth. In view of these references alone, it must be held that there was no invention in making the change which was effected by Dr. Richmond in the fall of 1881, by substituting the closed cap in the place of the cap with a partial floor or without a solid floor. All that Richmond did was to close a band or ferrule with a bottom of gold and build up his artificial crown upon it, and the way to do this had been already pointed out.

The patent cannot be sustained upon the theory that Dr. Richmond was experimenting with and improving his method of making and inserting artificial tooth crowns during the time intervening between his operation in San Francisco, in 1876, until at last, with the change to the closed cap made by him in the fall of 1881, he succeeded in perfecting an invention which up to that time had been inchoate or incomplete. During all this period he had been demonstrating and practicing the invention in public to dentists throughout the United States and in his private practice with all the variations of mechanical detail. Those to whom he taught his method for compensation bought their instruction in order to practice the invention in their profession; they did practice it and it was put into successful use in all parts of the country; and it is now too late to deprive the public of what became rightfully theirs by supplementing to the invention a mere matter of mechanical improvement which in itself had no patentable novelty.

The third patent in suit is No. 277,933, granted May 22, 1883, to Alvan S. Richmond, assignor, etc., for an artificial denture.

It is sufficient to say of this patent that in view of the inventions of Dr. C. M. Richmond and Dr. Low, the first and third claims embrace nothing which involves invention, and that carrying the metal of the bridge under the wearing surface of the porcelain does not impart patentable character to the third claim.

At the hearing of the cause, we indicated sufficiently the reasons for considering the fourth patent upon which the suit was brought invalid for want of novelty, and it is unnecessary to enlarge upon them now.

A decree is ordered for an injunction and an accounting as to the first of the patents in suit. As to the others the bill is dismissed. Neither party is awarded costs.

E. N. Dickerson, Jr., and E. N. Dickerson, for the plaintiff.

John Kimberly Beach and S. J. Gordon, for the defendants.

(Endorsed) United States Circuit Court, Southern Dist. of N. Y.—The International Tooth Crown Company vs. Richmond et al.—Opinion, Wallace, J.—U. S. Circuit Court.—Filed February 22, 1887.—Timothy Griffith, Clerk.

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ORIGINAL COMMUNICATIONS.

DENTAL CARIES UNDER THE MICROSCOPE.

BY ALFRED GYSI, D.D.S., AARAU, SWITZERLAND.

It is my intention in this paper to show those who have not the opportunity of seeing and studying dental caries under the microscope some illustrations of what may be seen under its different powers. The most important part of the contribution will be the drawings.

As there are different and antagonistic theories regarding dental caries, it will not be amiss to give a short historical review of the most prominent, in the order in which they have been offered to the profession.

Ancient writers have expressed views on this subject, as far back as A. D. 40, but the first scientific theory offered was by Boudett and Jourdain (1754-1766), who advanced the vital or inflammatory theory. This theory regarded dental caries as the result of an inflammation caused by deficiency in the nutrition of the dentine, and having a central origin.

In the year 1830 this theory began to be questioned, and in the year 1835 Robertson, of Birmingham, England, brought forward the chemical theory. Robertson found that in the human mouth there were acids present, derived from abnormal secretions, or from the fermentation of food which had found lodgment between the teeth, and that these acids are capable of decalcifying the teeth. According to this theory caries has always an external origin. There have been various theories in respect to this,—for example, the mineral acid theory of Dr. George Watt, of Ohio, according to whom there is the nitric acid caries, or white decay; the sulphuric acid caries, or black decay; and the hydrochloric acid caries, which has intermediate colors. Another chemical theory is the organic acid theory, first introduced by Dr. Magitot, of Paris,—those organic acids which are produced by fermentation.



FIG. 1.

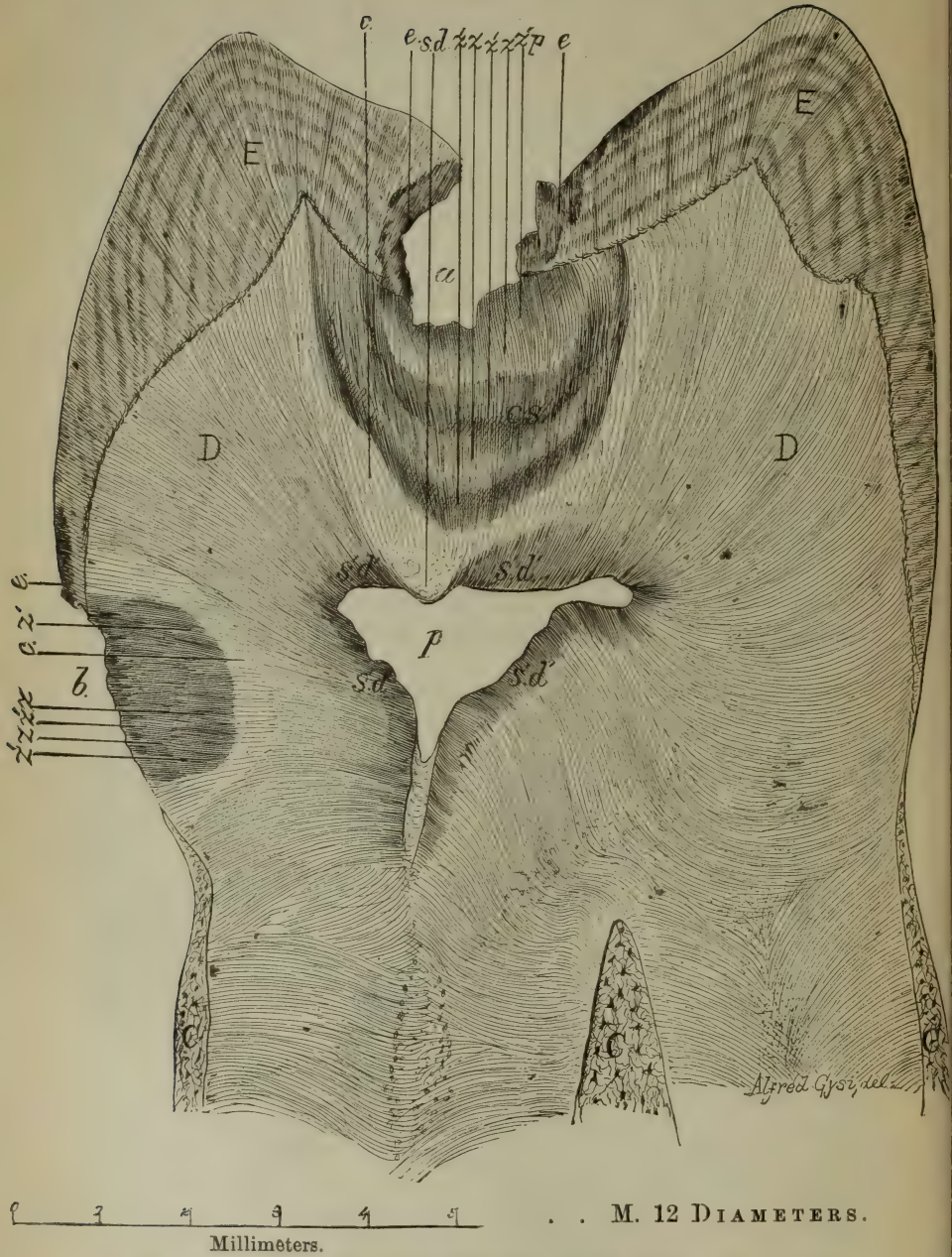


FIG. 1.—Fig. 1 represents a longitudinal ground section through the crown of an inferior molar of the negro. E, enamel; D, dentine; C, cement; p, pulp-chamber; a, large decay, from the grinding surface; b, small decay, from the mesial surface; c s, cone of septic invasion and discoloration; e, partly decalcified and discolored enamel around the carious cavity; z', dark cones; z, clearer cones; z/p, oldest cones where putrefaction of the tooth-cartilage begins; c, outer transparent zone, or zone of Tomes; s d, secondary dentine, caused by irritation; s d', secondary dentine deposited by normal physiological process, recession of the pulp. This plate is drawn from a ground and polished section mounted in Canada-balsam.



But these chemical theories were strongly opposed by M. Désirabode, who contended that caries often commenced its destructive effects in the pulp-chamber, working from the inside of the tooth outwardly, and that caries could not therefore be the result of the action of an acid.

Then came the fermentative or putrefactive theory, which was only another phase of the chemical theory. No one really knows the causes of fermentation, nor how acid is produced by it. Justus Liebig tried to explain it in his molecular-motion theory of fermentation, but before he could publish his reasonings on this subject there arose, in the year 1838, antagonistic views to his, from the discovery of the yeast-plant by Schwann.

This was the germ, parasitic, or septic theory, as it is usually named. This theory taught that dental caries was entirely due to the action of micro-organisms, but this does not fully explain the process, because these fungi or micro-organisms, as they are generally called, cannot penetrate sound and normal enamel.

In the year 1859, John Tomes advanced, in the first edition of his "Dental Surgery," a new theory,—the chemico-vital theory. An expert microscopist and histologist, he found that the dentine was endowed with vitality by the fibrils in the dentinal tubuli, which received their nourishment from the pulp. He explained dental caries as follows: If a tooth is attacked by an acid and the dentine exposed, irritation is conveyed to the pulp through the dentinal fibrils, and reacts against the invasion of disease by throwing lime-salts into the fibrils, causing their calcification and thereby the entire solidification of the tubuli. By these means a solid wall of dentine is presented to the advancing disease.

In the year 1868 Bridgeman propounded the electro-chemical theory, according to which the crown of the tooth becomes the positive electrode, and the tissues by which the tooth is invested the negative. If, now, the secretions of the mouth are abnormal, the electric current is intensified, and the crown yields up its lime-salts, setting free the acids with which they were combined; and this leads to molecular disintegration of the substance of the dentine in the form of caries.

The latest theory is that termed the chemico-parasitic, according to which dental caries is produced as follows: At some favorable point on a tooth by the action of fermentation the enamel is decalcified, and proceeding further the dentine is attacked. After the removal of the enamel this spot forms a most favorable point of lodgment for the micro-organisms, which can now penetrate the dentinal tubuli, decalcification proceeding by the acid formed by these organisms, until nothing is left but the tooth-cartilage, which then undergoes putrefaction.

FIG. 2.

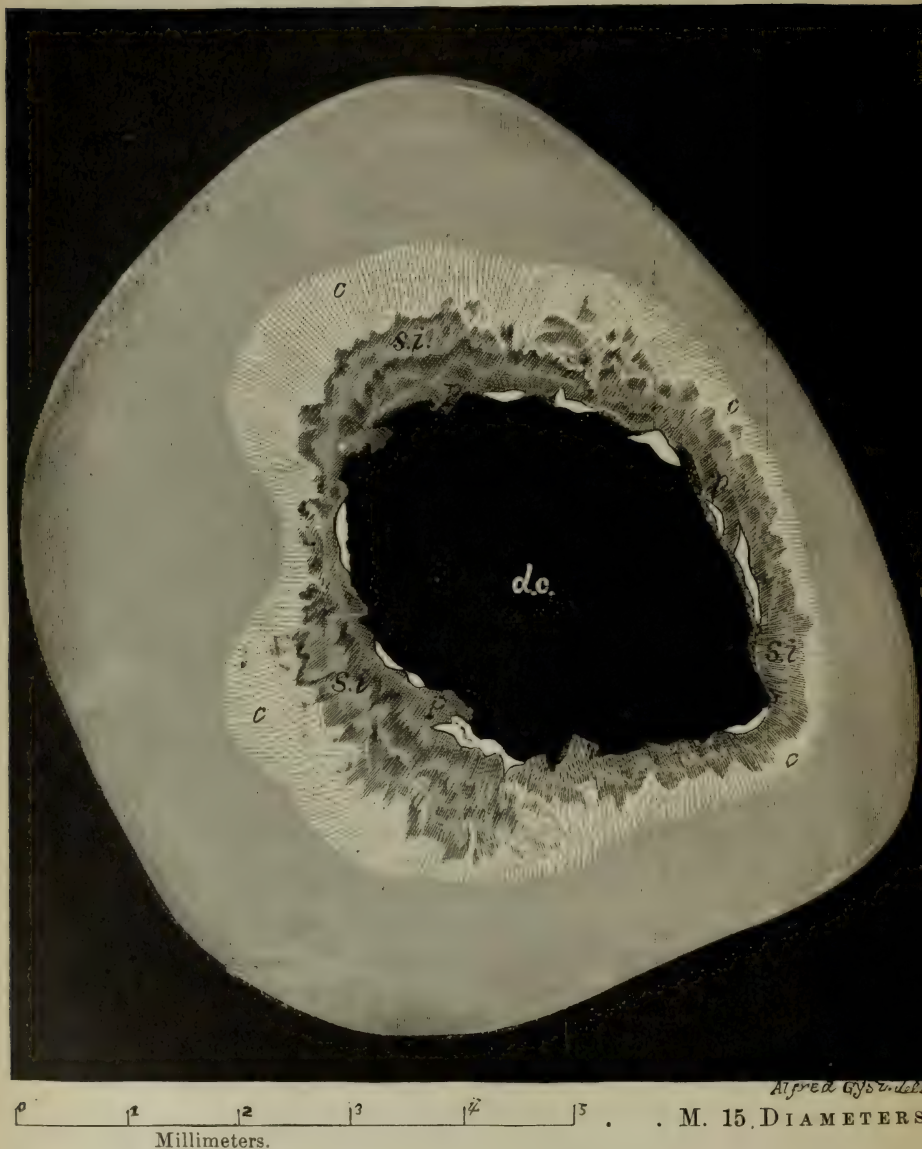


FIG. 2.—Transverse section through the crown of an inferior molar, carious from the grinding surface. This plate is drawn from a section made after artificial decalcification in nitric acid, cut by the collodion-paraffin imbedding process, and mounted in glycerin; by the act of decalcification all the enamel was dissolved; the drawing, therefore, shows only the dentine. Drawn just as it appears by polarized light: c, transparent zone; s i, septic invasion; d c, cavity of decay; p, putrefactive zone, where the rotten dentine crumbles off piece by piece.

As all my experiments and investigations on this subject have presented facts which are consistent with this theory, I accept it as a satisfactory explanation of dental caries.

Let us now consider the phenomena of caries as shown by the illustrations.

Caries never begins on a smooth surface kept perfectly clean by the friction of the lips or tongue, but always on uneven, defective, or rough places, or between the teeth where lodgments of food occur, or opportunity is afforded for fungous growths. Collections of food take place between teeth which do not touch each other; while fungous growths occur between teeth which come in contact with one another, thus affording positions for micro-organisms to attach themselves where they are not disturbed by either the tooth-pick or by mastication. Food deposits are soon invaded by micro-organisms, which are constantly present in the mouth. Dr. Miller has determined twenty-two different fungi in the human mouth, of which sixteen are capable of producing acids in fermentable substances. If the retained food contains fermentable substances, these are decomposed and lactic acid is produced, as Dr. Miller determined by exact and difficult analysis. At the same time the food acts as a sponge and absorbs the produced acid, keeping it constantly in direct contact with the teeth.

In cases in which fungous growth is present, and some of these sixteen acid-producing fungi are decomposing the fermentable fluids of the mouth, the newly-formed acid is neutralized if the saliva be normal, but when the saliva is acid the acids formed by the fungi can act undisturbed.

After some time, varying with the strength and quantity of the acid, the enamel at the point attacked is decalcified and disintegrated, so as to form a pasty mass. The same process takes place in the fissures between the cusps of the bicuspid and molars. Now, it is easy for the fungi to penetrate this softened enamel, especially for the very minute micrococci, and of these the coccus *a* of Miller (see Fig. 10) is the most destructive, abundant, and smallest of all, measuring only  $\frac{1}{20000}$  of a millimeter in diameter, or the  $\frac{1}{50000}$  part of an inch. In this softened spot these organisms continue their work of producing acid, which now affects the underlying dentine. At first the softening and with it the invasion of the fungi follows the course of the natural openings, the dentinal tubuli, and therefore the very first decay has a cylindrical form (see Fig. 4). But as in the outer layers of dentine there are many anastomosing branches between the tubuli, the softening and septic invasion spreads out laterally, and so the decay takes the form of a cone with the apex toward the center of the tooth (see Fig. 1). In a short time the



FIG. 3.



1 Millimeter divided into tenths.

. M. 25 DIAMETERS.

FIG. 3.—Transverse section through the crown of a left superior bicuspid, carious from the mesial and distal surfaces. This plate is drawn from a section cut with the freezing microtome, after decalcification in nitric acid. All enamel dissolved. The fungi in the dentinal tubuli were then colored in aniline-gentian violet, and the section then mounted in monobromide of naphthaline. *m*, small decay, from the mesial surface; *d*, large decay, from the distal surface; *p*, the very top of the anterior pulp cornu; *dz*, dark zone around the cone of decay; *pz*, zone where putrefaction has set in. The dark parts indicate the tubuli in which fungi are present.

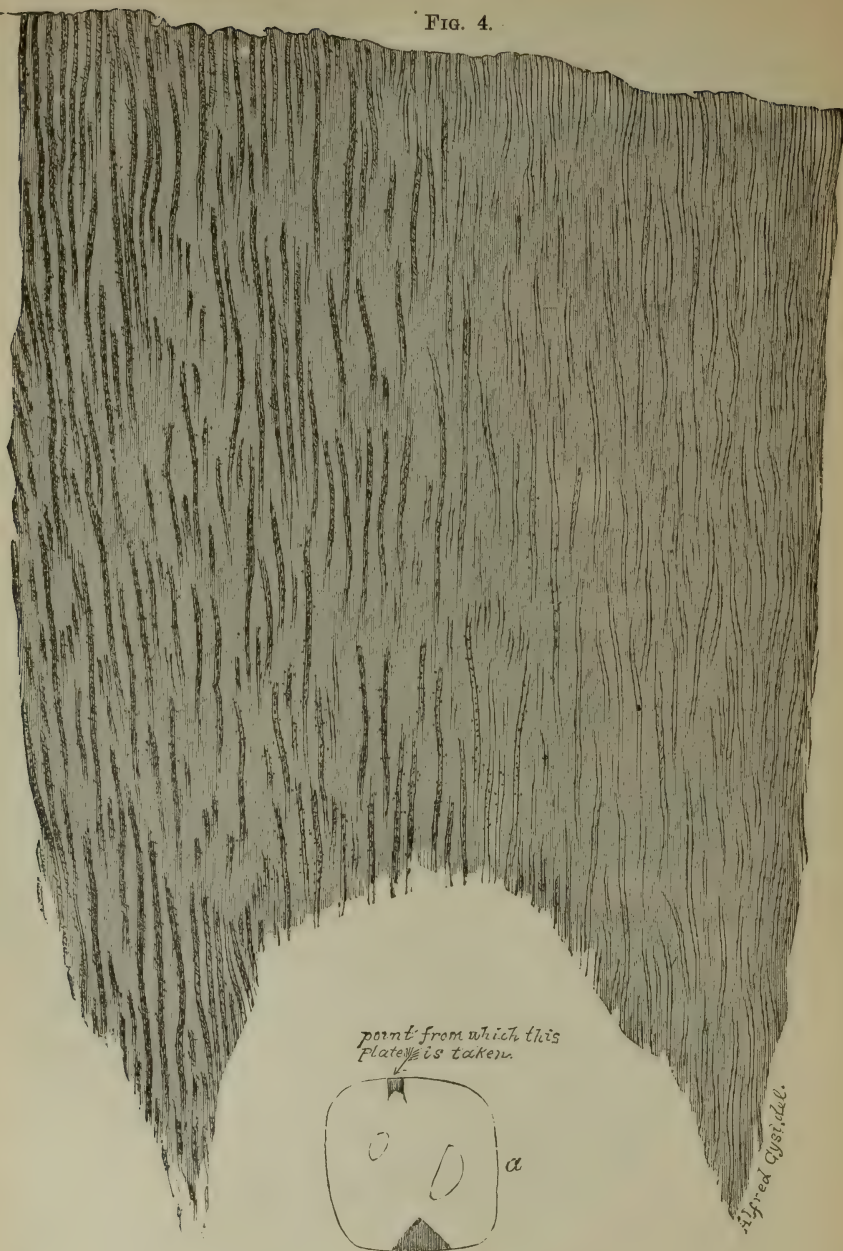
base of the cone increases in size, thus becoming much larger than the original opening in the enamel, undermining the latter and leaving its walls unsupported, causing them to break down in the act of mastication.

As the septic invasion goes on, discoloration ensues. If the decay be rapid it is slight, but darker when the decay is slow. This discoloration is due to the deposition of coloring matter into the partly decomposed tissue, and that comes from sulphureted hydrogen, from corrosion of the metallic elements which may be present in the mouth. The discolored cone of septic invasion is surrounded by a clear, transparent zone, which defines the decay from the healthy dentine, and indicates the point to which the acid has penetrated, softened and changed the tissues (see Fig. 1, c), the dark cone indicating the point to which the fungi have penetrated, and the clear zone around it the advancement of the acid formed by the fungi. Fig. 1, s d, shows where the apex of the transparent cone has just reached the pulp, and the acidity of this zone has produced an irritation, occasioning the formation of a small nodule of secondary dentine.

The clear zone can be seen, too, in decalcified sections, but here it is necessary to observe it in alcohol or glycerin, and by the dark-field illumination, or, what is still better, by the aid of polarized light. This shows that not only the lime-salts but the tooth-cartilage is also affected by the acid in this zone (see Fig. 2).

If, at the period when there is no cavity yet formed in the dentine, the enamel is removed and the decay closely observed, it can be seen that it consists of concentric and different colored rings as shown in Fig. 13. These rings can be seen also in sections, where they present themselves as alternate dark and light colored zones (see Fig. 1, z and z'). Ordinarily the zone touching the transparent zone is the clearest defined of all, as can be seen in Fig. 3, d z. If this zone be examined under a high power, it will be seen that the dentinal tubuli contain more micro-organisms than those in the other zones. Decay can therefore be regarded as being composed of a number of hollow cones, one fitting into the other. If, now, we examine more closely the dentinal tubuli in the cone of septic invasion, we find that their diameter is twice to four times larger than normal, the result of the complete decalcification and decomposition of the tooth-cartilage around the tubuli by the action of the micro-organisms (see Figs. 5, i, and 6, e). When these tubuli become so much enlarged as to touch each other, and finally to unite to form larger tubes, septic invasion takes place much more rapidly (see Fig. 7, u). After the decay has penetrated the dentine for some distance, the outer layers are already completely decalcified, nothing remaining but tooth-carti-

Fig. 4.



M. 158 DIAMETERS.

 $\frac{1}{10}$  of a Millimeter divided into hundredths.

FIG. 4.—Transverse section through a small portion of dentine, showing the very beginning of decay in the dentine. Drawn from a section of a decalcified deciduous molar. The fungi in the dentinal tubuli are colored with aniline-gentian violet. Mounted in monobromide of naphthaline. This illustrates the cylindrical form of decay without lateral spreading. 1, limit of enamel and dentine. With the naked eye and before coloring no trace of decay could be seen. (For clearness only the infected tubuli are illustrated. Only the left half of the diagram is finished.)



lage, this becoming permeated by fungi from the canals (see Fig. 9, pt), and putrefaction commences. The result of putrefaction is the total destruction of the remaining tooth-cartilage, and the carious cavity begins to be formed. By this process the decay progresses until the whole crown of the tooth is destroyed, if no means are taken to stop its advancement.

The micro-organisms found constantly in dental caries are five in number, which Dr. Miller, of Berlin, determined and cultured by long and tedious labor and designated by the Greek letters  $\alpha$ ,  $\beta$ ,  $\gamma$ ,  $\delta$ ,  $\epsilon$ . Of these the  $\alpha$  and  $\beta$  fungus occur without exception in every dental decay, and more abundantly than the other three. The  $\alpha$ ,  $\gamma$  and  $\delta$  fungi are cocci of different size and form. The  $\beta$  fungus occurs in cocci, bacteria, and leptothrix, and the  $\epsilon$  fungus is not unlike the comma bacillus of Koch. These all have the power of producing lactic acid from sugar, and by the aid of the saliva from starch.

The fungus  $\alpha$  (see Fig. 10) is considered to be the most destructive in dental caries.

In order to prove that these fungi are not accidental in dental caries, as some assert, Dr. Miller tried to induce artificial caries, by infecting sound dentine out of the mouth with the different fungi, and was successful in so doing. On examination of this artificial caries under the microscope, he was unable to distinguish it from natural caries; that is, the tooth became decalcified, the tubuli were packed full with the fungi and enlarged, and the dentine appeared exactly as in the natural decay. Another proof is that when a tooth is decalcified by an acid with the exclusion of these fungi, the dentinal tubuli retain their normal diameter, the softened dentine is not discolored, and putrefaction does not occur. Dr. Miller examined about one thousand slides of carious dentine, and in every one these micro-organisms were present.

I examined fifty carious teeth, and every one was infected by these micro-organisms as herewith illustrated (the  $\alpha$  and  $\beta$  fungus of Figs. 10 and 11), and which I have cultivated from carious dentine, by means of the usual culture methods.

Besides the fungi ordinarily found in decay, I found another one which I have illustrated in its minutest details in Fig. 12. I discovered it in a pulp exposed by decay, completely filling the top of the pulp-chamber, fastened on the walls, where it was growing toward the interior of the pulp. Examined by a high power, it will be seen that it is composed of long cells containing large and small globules, which I regard as spores; the long cells are so arranged as to form stems and branches, not unlike a tree. I have never seen a description nor an illustration of this fungi, and hope that anyone who may have any knowledge of it will give us all the information possessed regarding it.

# METHODS USED IN MAKING THE PREPARATIONS FOR THIS KIND OF INVESTIGATION.

As a knowledge of the methods for the preparation of carious teeth for microscopical examination may be of interest, I append here a short description of the processes employed which I have

FIG. 5.

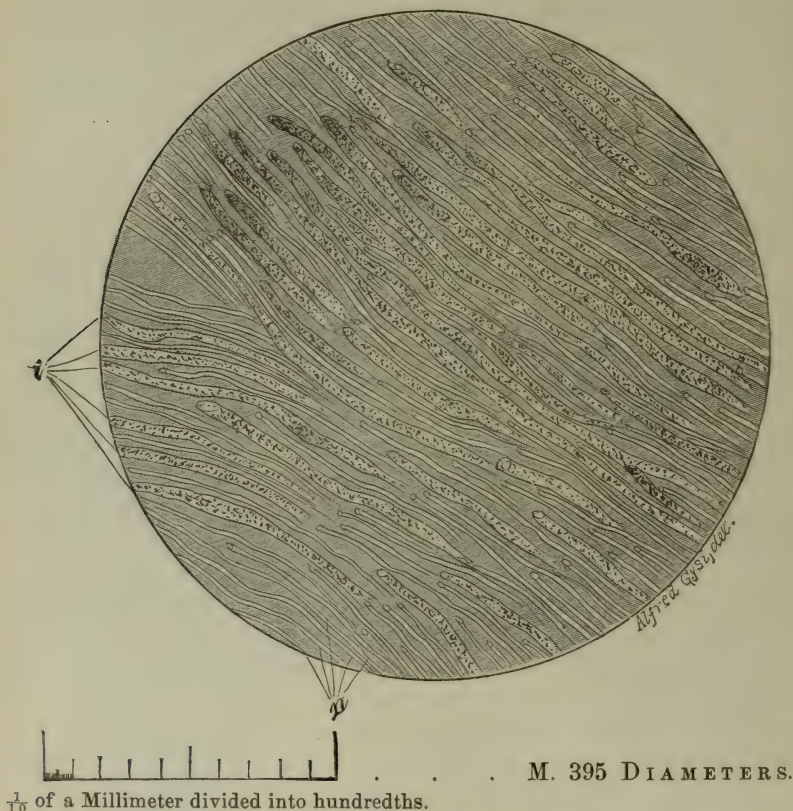


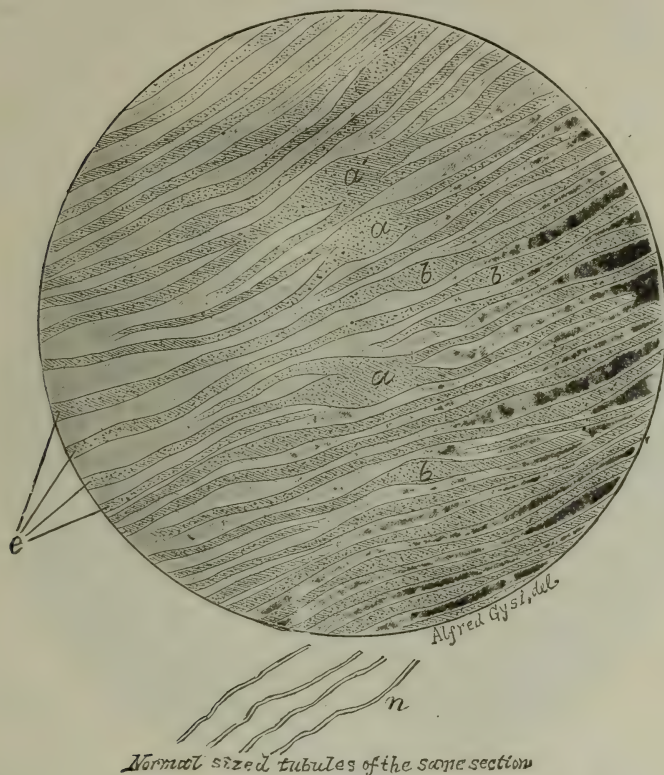
FIG. 5.—Fig. 5 represents the part *a* in Fig. 3, more highly magnified; showing normal, and with fungi-infected tubuli; *n*, normal diameter of tubuli; *i*, enlarged tubuli containing micrococci.

found to give the most satisfactory results. There are two principal methods,—with or without decalcification.

*I. Process without decalcification, or grinding process.*—Take a freshly-extracted tooth and grind it down with a coarse corundum-wheel to a pretty thin lamella, according as a transverse or longitudinal section is desired. For example, the molar illustrated in Fig. 1, I ground from both sides, so as to get a lamella from the central part in which the decay in the coronal surface was situated. The

striated parts indicate those which were ground away (see Fig. 14). By this means I got the lamella illustrated in Fig. 15. This lamella should then be ground on one side perfectly even on a fine stone, and then polished on the same side upon leather coated with some fine polishing powder until no rays are visible on this side anywhere.

FIG. 6.



*Normal sized tubules of the same section*



M. 385 DIAMETERS.

$\frac{1}{10}$  of a Millimeter divided into hundredths.

FIG. 6.—Fig 6 represents a small portion of carious dentine of a lateral incisor. Dentinal tubuli filled with cocci. n, normal-sized tubuli from the same tooth and same section; e, tubuli enlarged by the action of the cocci; a, tubuli with saccular enlargements uniting two tubuli; a', three tubuli united by saccular enlargements; b, smaller saccular enlargements.

The lamella should then be cemented with the polished side down on a glass slide, such as is used for putting up microscopical preparations, with some thick Canada-balsam, which is easily softened by heating, and then firmly pressing the lamella against the glass. Around the lamella are cemented some exceedingly thin pieces of covering-glasses as used in microscopy (see Fig. 16).



Practically it is best to cement on the other side of the glass a piece of cork, so that the slide can be easily managed during the further process of grinding. The lamella is then ground by hand on a fine and perfectly flat stone until all the thin covering-glasses are

FIG. 7.

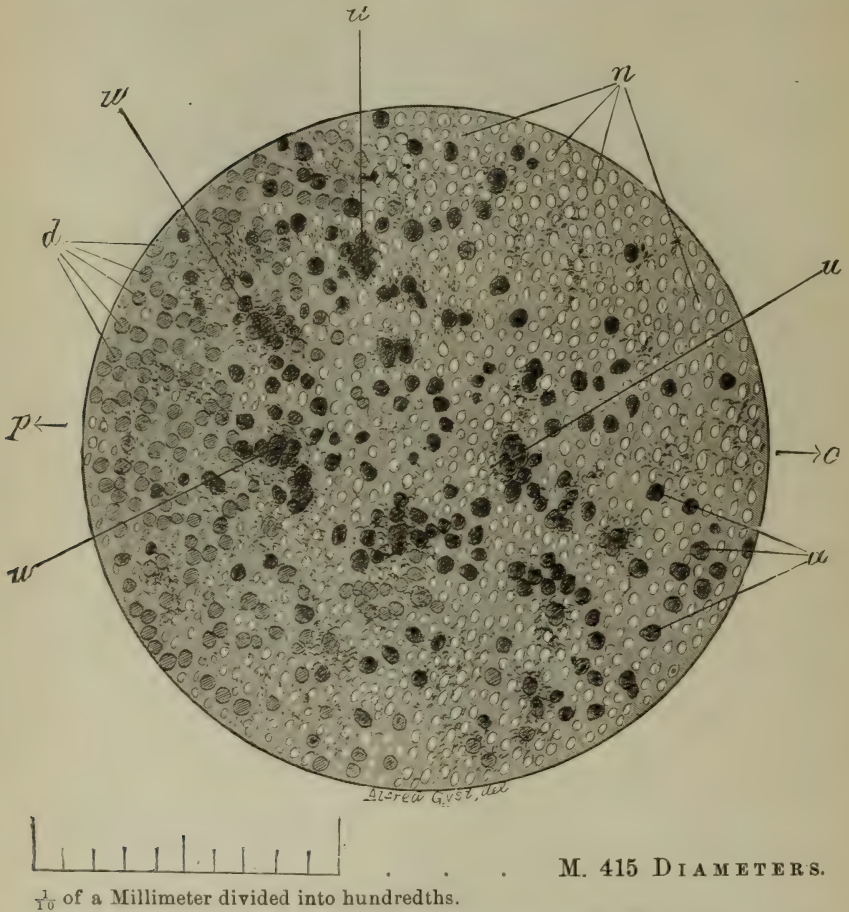


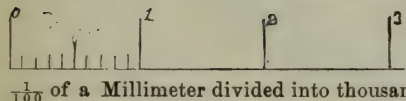
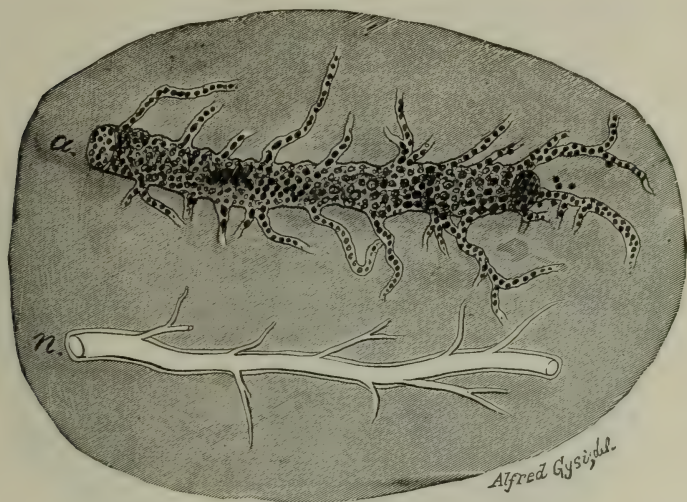
FIG. 7.—Fig. 7 represents a section through slightly carious dentine; tubuli transversely cut. This section is from a superior bicuspid, and was colored with aniline-gentian violet to show the tubuli which contain the micro-organisms. Mounted in styrax; c, towards the center of the tooth; p, towards the exterior of the tooth; n, normal diameter of the tubuli; a, abnormal diameter of the tubuli, which are completely filled with micro-organisms; u, very much enlarged tubuli, uniting with their neighbors to form larger tubes; d, tubuli in which discoloration has set in.

evenly touched. By this process the lamella is made of an equal thickness, with the cover-glasses cemented around it (see Fig 17).

The cover-glass pieces are then removed, and the lamella ground still thinner; when thin enough it generally detaches itself. All

this grinding must be done with water on a water-stone. The final step is to polish it on this newly-ground side. The exceedingly thin plate procured in this manner should then be washed in alcohol, and every particle of polishing-powder brushed off with a fine camel's-hair brush. The ground section is now ready for mounting. For this purpose it is placed in absolute alcohol for five minutes or longer, by which every trace of water is removed. It is then transferred to oil of cloves to clear it; then placed on a clean glass slide,

FIG. 8.



M. 1700 DIAMETERS.

$\frac{1}{100}$  of a Millimeter divided into thousandths.

FIG. 8.—Longitudinal section through two dentinal tubuli. n, normal tubule with its branches; a, abnormal tubule with its branches, all filled with the fungus *a* of Miller. The fungus has been colored with aniline-gentian violet. Section mounted in styrax.

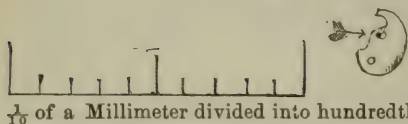
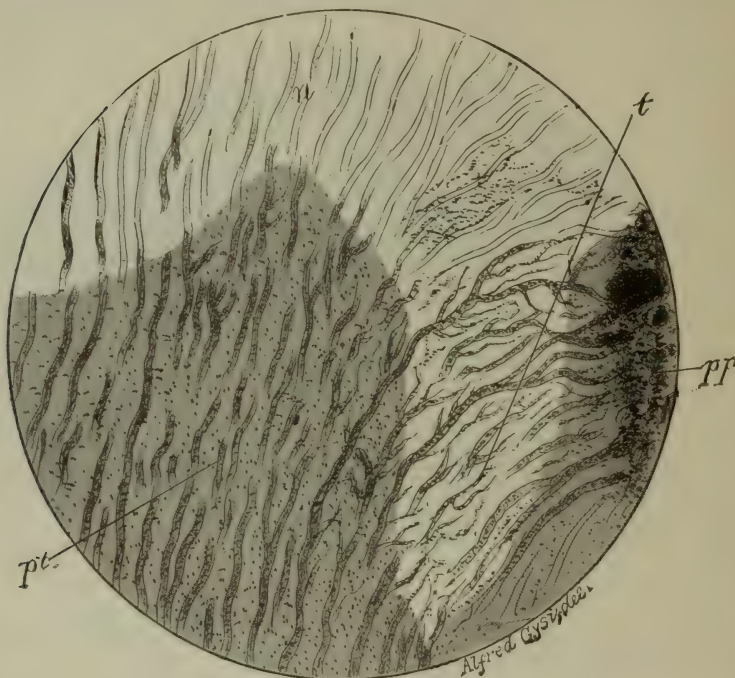
a drop of Canada-balsam put on it, and covered with a thin cover-glass. The preparation is now finished and ready for examination under the microscope.

**II. Process by decalcification.**—Place a freshly-extracted tooth in a large quantity of a four per cent. solution of nitric acid. After a week try if the tooth is fully decalcified by sticking a fine needle through it; if the needle easily goes through, the decalcification is complete; if not, put the tooth in the solution again. When the tooth is fully decalcified it must be coated with a layer of collodion and imbedded in the microtome with melted paraffin. The coating with collodion is essential, because, if the decayed portion comes in

contact with the paraffin and its volatile oils, many of the micro-organisms will lose their power of taking up the stains necessary for putting them in evidence.

When the imbedding process is finished, freeze the tooth in the microtome, either by putting it in an ice and salt mixture, or by ether or rhigoline-spray, and while frozen cut it in fine sections with

FIG 9.



M. 395 DIAMETERS.

FIG. 9.—Section through highly carious dentine, in which putrefaction has set in. pp, pulp-chamber; pt, beginning of putrefaction in the remaining tooth-cartilage; n, normal dentine; t, tubuli, allowing the fungi to reach the pulp, and so starting its putrefaction. The dark-colored parts represent the fully decalcified dentine, which allows the fungi to leave the tubuli and penetrate the tooth-cartilage, causing putrefaction to set in.

a very sharp razor. The paraffin is then removed and the section put in absolute alcohol, after which it is ready to be stained.

I tried about twenty different staining colors without success, until I found the following method gave the most satisfactory results: Take an ounce of water, and add to this about ten drops



FIG. 10.

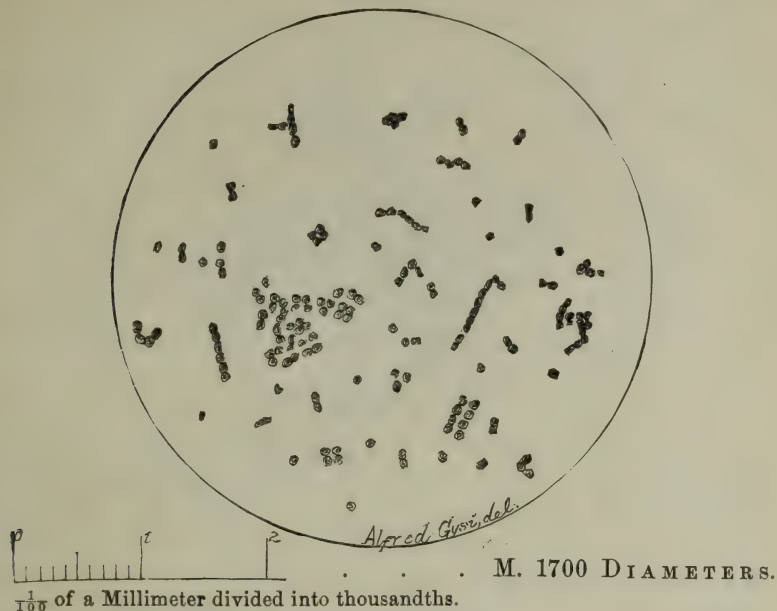
FIG. 10.—Fungus  $\alpha$  of Miller, occurring in cocci, diplococci, and in chains.

FIG. 11.

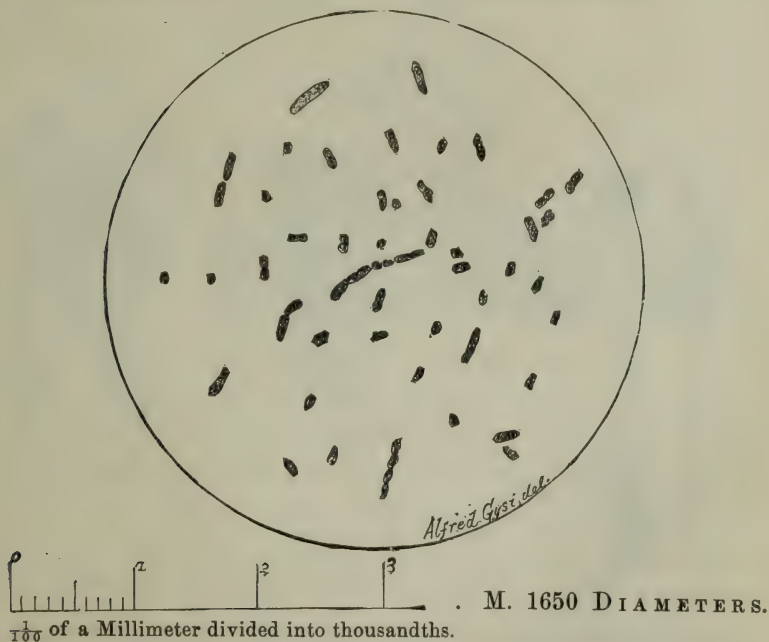
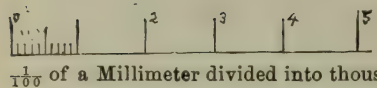
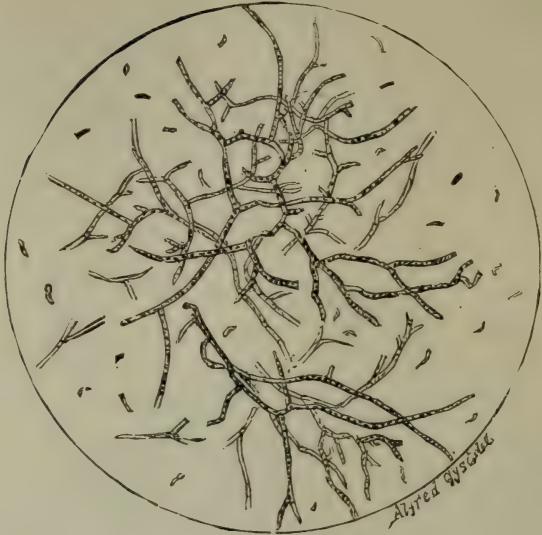
FIG. 11.—Fungus  $\beta$  of Miller, occurring in cocci, diplococci, bacteria, and often in leptothrix.

FIG. 12.

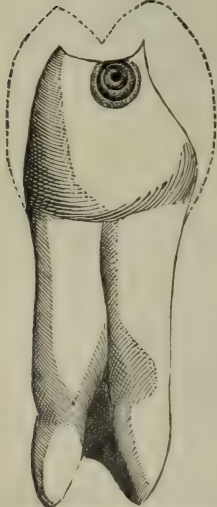


M. 920 DIAMETERS.

1/100 of a Millimeter divided into thousandths.

FIG. 12.—Fungus growth unknown to me, found in the pulp-chamber of a largely exposed pulp.

FIG. 13.



Different colored Rings in decay of dentine before cavity is formed.

FIG. 14.



Ground down from both sides.

FIG. 15.



Lamella after Grinding.

pure aniline oil (*anilinum purum*); shake well, and let it stand for an hour; during that time the water will have dissolved some of the oil. Then filter through a wet filter-paper. To the clear filtrate just enough of finely-powdered aniline-gentian violet is added to make a very dark solution. This color must be filtered each time

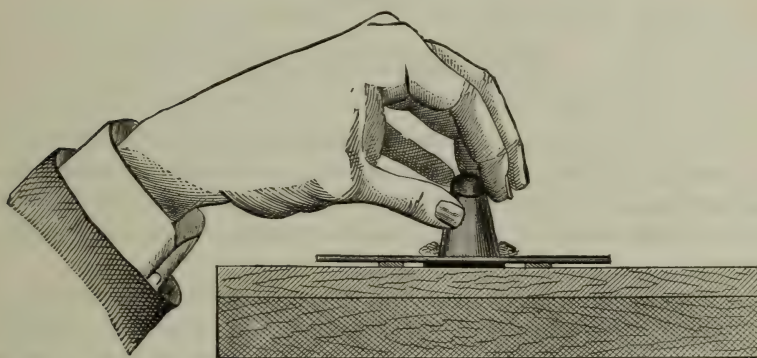
FIG. 16.



Pieces of thin Covering-glasses cemented around Section.

before using. The sections should now be placed in a filtered solution of this color and allowed to remain in it for twelve hours; then taken out of the color and placed in a solution of iodo-iodide of potash (iodine 1.0, iodide of potash 2.0, water 300.0). In this they should remain only two or three minutes, and then be placed in ninety-

FIG. 17.



Ground until thin Covering-glasses are evenly touched.

five per cent. alcohol, in which they are fully discolored, leaving the carious parts still violet. This takes place, when the sections are exceedingly thin, in from one to two hours, but for thicker ones six to twelve hours are required. When so cleared, the sections are

**NOTE.**—All of the figures were drawn by means of Nachet's camera-lucida, and with the objectives of Seibert (Wetzlar, Germany), No. II, No. V<sup>a</sup>, and the water immersion VII<sup>b</sup>, with correction. Figs. 1, 2, 3, with objective No. II. Figs. 4, 5, 6, 7, 9, with objective No. V<sup>a</sup>. Figs. 8, 10, 11, 12, with objective No. VII<sup>b</sup>.



placed in absolute alcohol, and brushed on both sides with a fine camel's-hair brush; after this they are placed in oil of cloves for a final clearing. They are now ready for the finishing step,—that is, they are to be mounted in the above described manner in Canada-balsam, or in styrax, or monobromide of naphthaline. Of all these mounting mediums I prefer the styrax, because the outline of the micro-organisms can be the most distinctly seen when prepared in this medium.

I prepare it in the following manner: I take the crude styrax (*styrax officinalis*) and dissolve it in a large quantity of chloroform; the whole mass is then warmed, and while in this condition filtered through fine filtering-paper; the clear yellow filtrate is then evaporated until it has a thick consistence like molasses. It is now ready for use.

Carious teeth prepared in this way appear under the microscope just as illustrated in the drawings. The micro-organisms can be very distinctly seen, as they are of a dark-blue color. No other color or method has given me such complete and satisfactory results as the one described; and I strongly recommend it to all who are engaged in this kind of investigation.

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### IMMEDIATE ROOT-FILLING.

BY J. SMITH DODGE, JR., M.D., D.D.S., NEW YORK, N. Y.

THIS practice may be familiar to others, but it came to my mind as a direct application of Listerian surgery, and I am not aware that anyone has adopted it outside of my immediate circle. At any rate, the uniform results of about a year's experience lead me to publish my plan.

What is here said relates exclusively to roots from which the dentist removes a portion of living pulp. It may be only that little fiber near the apex which is so slow to die, or it may be any greater amount. But unless the last of the pulp removed gives pain, or (what I like better) is followed by a drop of blood, this article has no reference to that root. And if the final bit of root-pulp is taken away alive, it makes no difference what may have been the condition of the rest. When I have a hopeless pulp to get rid of, with immediate root-filling in prospect, I generally make an application of arsenic and wait till the bulk of the pulp is dead. Those who, after removing this, pass a fine broach actually to the apex will seldom fail to find the desired remnant of life. I have several times disregarded the slight apical soreness which often accompanies the death of the pulp, and have had no bad result.

The process is simply this: Being sure that a shred of living pulp remains, I make everything ready for the entire operation, with full protection of the tooth from saliva. The living shred of pulp is quickly removed; any blood that follows is absorbed by a thread of bibulous paper passed up the canal; the strongest possible solution of carbolic acid is injected into the canal, churned to the apex with a broach, and absorbed with a thread of paper; then a thread of gutta-percha (Hill's stopping) previously prepared and cold is passed as far as possible into the canal, and with warm wires packed to the very end. When the filling is pressed against the apical constriction, it generally gives a little pain, which is satisfactory as showing that the canal is full. When the whole root is filled to the pulp-chamber, it is forever disposed of.

Of course, if there are two or three roots, the same process is applied to all which have canals large enough to permit the manipulations. If any canal is too small for this, it may be freely carbolized and left. I have never, under this or any other treatment, seen trouble from the pulp in a canal which was too small to admit Johanson's broaches.

This finishes the roots. The dentist may do what he likes with the crown.

I have not counted my cases, but they cannot be less than twenty-five or thirty, extending over nine or ten months. Not a single one has had any subsequent trouble. The longest pain was for about an hour, and then absolutely ended. Nearly all have been entirely right by the time the roots were filled.

The plan is based on the well-proved fact that a clean flesh-wound, disinfected and closed from the air, will not suppurate. Abundant experiment has proved this, and all surgeons act on it daily.

To tear away a shred of living pulp leaves at the apex a clean flesh-wound.

If the pulp were alive up to the pulp cavity, I should not care for the carbolic acid after removing. But as the filling material must pass through a part of the canal which may have become infected, it might carry along germs enough to do mischief, and so I fill the canal with the antiseptic.

It is my belief that the habit of waiting a little after the pulp is removed, to see if there will be any trouble, is like those prophecies which are said to fulfill themselves. The waiting brings the trouble.

## PROCEEDINGS OF DENTAL SOCIETIES.

## NEW YORK ODONTOLOGICAL SOCIETY.

THE New York Odontological Society held its regular meeting, Tuesday evening, January 11, 1887, in the parlors of the New York Academy of Medicine, No. 12 West Thirty-first street.

The vice-president, Dr. J. Morgan Howe, in the chair.

## INCIDENTS OF OFFICE PRACTICE.

Dr. S. G. Perry. Some little time ago Dr. Bogue had the kindness to send to me from Paris a set of matrices which I believe are made by Ash & Sons, of London, and are known as the Ladmore-Brunton set. My first impression was that they were of little value, and I questioned whether we had not already in this country several that were superior to them. However, after some trial of the matrices, I came to like them better, and find that the more I use them the better I like them. The matrix is simply a little band of steel with holes in each end, and so shaped as to pass between the teeth and be caught by little fingers which engage in the holes and are controlled by an adjusting screw. With it comes a very neat watch-key wrench, the flexibility of which makes it easy to use in almost any position. One of the principal advantages is that the matrix adjusts itself to the narrow necks of the teeth. It will turn in or out just as the tooth may be shaped, so that an adjustment to the tooth can be obtained that is a little closer than is practicable with any other matrix I have seen. One of the disadvantages is that it goes entirely around the tooth, and takes up a little space on both approximal sides of the tooth, but it is made very thin, so that that objection is perhaps not very great after all. It is so thin that you can pass it between almost any two teeth where floss silk will go. Still, in the restoration of contours I do not like the idea of the matrix going entirely around the tooth; I think if it went only half way around it would be better. Another objection is that it is made up of two parts, of which one is so springy that it slips out of your hand and flies anywhere in a provoking way. At the same time, I do not find any matrix more satisfactory for a certain class of cases. If it is desirable to bulge the filling at any point, it can be done by loosening the screw a trifle and using the mallet with a little more force than usual.

Dr. C. A. Woodward. I wish to report under incidents of office practice a case of implanting and transplanting two lower central incisors. Perhaps some gentlemen who are present will remember seeing Dr. Younger perform the operation, some three months ago.



One of the teeth had been out for some years, and the alveolar process was so thin that several who saw the patient before the operation was performed said it was impossible to put a tooth in its place, as the ridge was not thick enough to contain it. It was one of the first operations performed by Dr. Younger in New York. I was not careful in the selection of the teeth, and after having selected them I was not as careful in handling their roots as Dr. Younger is. He is very careful not to remove the pericementum from the root of the tooth, while I was not. The teeth were inserted by Dr. Younger. Ligatures were attached to them, and for about a week they appeared to be doing very well. At the expiration of that time they became loose. They were again tied, but no amount of tying would keep them in their places, and they came out. This result confirms the statement of Dr. Younger that the roots of the implanted teeth must be in good condition in order to be retained in the mouth. After that experience, which was some ten weeks ago, two more teeth were selected by Dr. Younger and put by him in the places of the others. They were tied with silk, and the ligatures were kept on for about three weeks. After the ligatures had been off for two or three weeks I examined the teeth and found they were very firm. I also found a deposit of osseous tissue around them, especially where the alveolar process was cut through, it not being thick enough to contain the root of the tooth. One of the teeth is so perfect in every respect that I do not think any person could detect that it had not grown in its present position. As to the other one, where the process was so thin, the gum has not come around the neck of the tooth as much as it should. But they have given the person no trouble whatever from the time they were inserted. He tells me that three days after they were implanted he could bite on them without discomfort. I have frequently, during the last two or three weeks, passed a very fine instrument down by the side of the root for the purpose of determining whether there was any real attachment, and I believe there is an attachment between the process and the roots of the teeth. The patient is here to-night, and I would be pleased to have the gentlemen examine the teeth and verify if possible what I have said as to their condition.

Dr. Benjamin Lord. This is a particularly interesting case, because some of the conditions were very unfavorable for the experiment of implantation. I saw the gum before the teeth were inserted, and I said that it was unreasonable to expect a tooth to become firm under such circumstances. The soft and hard tissues together were but little thicker than the back of the blade of a common table-knife, and when the socket was drilled to receive the tooth which

was to be implanted the instrument used came out at the side of the ridge. There was a short piece of root where the transplanted tooth now is, which was removed, the natural socket enlarged to the proper size and depth, and the tooth inserted. As we examine the teeth to-night we find them very firm, and there is evidently a union with the surrounding tissues, according to some theory that I do not pretend to understand. It is clear that our previous notions or theories in regard to repair and new growth are greatly disturbed. What the result will be in one, three, or five years none of us can tell, but as I said, it is certainly a most interesting case and well worth traveling a hundred miles to see.

Dr. N. W. Kingsley. Two cases have occurred in my own practice recently which possess some features more remarkable than the one shown this evening. The first operation was performed about the middle of November last for a lady patient somewhat over thirty years of age. She came to me with her teeth sound, beautiful, and perfectly regular, with the exception of the upper left central incisor and the upper left lateral. Those two teeth stood forward at an angle of nearly forty-five degrees from the plane of the adjoining teeth, and so far that she could with difficulty get her lips to cover them. She wanted me to regulate those teeth. I told her that, in any attempt to regulate them, there was some danger of her losing the teeth. She understood fully the possibilities of any such attempt, and determined that she would have them extracted and artificial teeth inserted if they could not be moved into a better position. Dr. Hasbrouck came to my office and extracted the teeth under nitrous-oxide gas. When they were removed we instantly looked for the membrane which has caused so much talk and which is considered so necessary to a successful result in these operations. The membrane was found covering the lateral, but the central was as devoid of it as though it had been scraped. We both remarked it. I made new sockets for those teeth, so that when they were replanted they would stand in the same line with the other teeth. I had also to deepen the sockets. One of the teeth had a curve at the end of the root, and as the curve was pointing outward, I felt that to get an accommodation for it I might pass through the alveolar process; and besides, the process over the apices of the roots seemed to be a little depressed on account of the pitch of the teeth. I removed the pulps and filled the canals, drilling through the crowns rather than through the roots as Dr. Younger does. I trimmed off the curved portion of the root of the central incisor, thereby straightening it somewhat, and replaced it. Then developed a new emergency. The space was not large enough to admit the two teeth. The central incisor, which was left standing

and in its proper position otherwise, had, from the fact that these two teeth had been pitched forward, inclined itself off somewhat toward the left side of the mouth. That inclination was favorable to what I had to do. I took a file and straightened that line, thus gaining something in space. I then ground off with a corundum-wheel the sides of both of the other teeth a little and polished them, thereby making them narrow enough to go into the space they were to fill. The teeth were then forced into their places, and an impression taken of all the teeth forward of and including the first bicuspid. The whole dental arch was now perfectly regular and symmetrical. In the course of three hours I had a splint made of gold which would fit accurately the fronts of those teeth, and which could be removed and replaced by the lady herself. I have seen the patient within a few days, and she says the teeth are perfectly solid, and they seemed so to me. Everything is healthy about them. But I do not propose to take hold of those teeth and subject them to unnecessary pressure. When a leg has been broken and restoration is going on favorably, I do not think it would be exactly fair to take hold of that leg, within a limited number of days or weeks, and subject it to undue strain. The lady tells me that occasionally she has replaced the splint for the purpose of ascertaining whether the teeth keep their places, and from the splint fitting as when first applied she finds there has been no movement. They are firm in their proper places, and the case is at the present moment a success.

The other case was that of a lady who has been a patient of mine seven or eight years. There was at one time an abscess in the place from which the upper right first bicuspid had been extracted, and a discharge of pus, and there was also a discharge of pus from the roof of the mouth. That abscess was cured and remained cured. The second bicuspid commenced moving towards the cuspid, and in the course of time had divided the space just about equally between the first molar and the cuspid, so that there was a space of about half the diameter of a tooth between the second bicuspid and the cuspid, and about an equal space behind the second bicuspid. I had made a little plate for her at one time, and put in a very narrow tooth to fill this space, but it was more or less an annoyance. When Dr. Younger showed what he was doing the lady became desirous of having a tooth implanted in this space. She consulted Dr. Younger, who said there was no chance to put in a tooth there unless the bicuspid was wedged back. It took three or four weeks to get space enough by the most forcible of wedging. The wedges used were pieces of hickory cut across the grain. The operation of implanting was performed about the middle of December. When I put the



lancet through the gum to cut the semicircular flap, I was astounded to find my lancet going into an opening,—undoubtedly the old abscess which had not filled up,—and this condition was further complicated by the open socket of the adjoining bicuspid, which had been moved to the left. There was apparently no process or outside wall whatever for the new tooth, its only covering on the outside being gum-tissue until I got up nearly to the apex of the root. The tooth that was implanted was one which was extracted from a patient of mine seven or eight years ago for the purpose of regulating other teeth. Immediately after extraction the tooth was set in a plaster cast, and remained there in the plaster until I selected it to implant in this lady's mouth. When implanted I made a little splint to support it. I do not believe in always depending upon tying. It is too hazardous. Ligatures are not always sufficiently firm to give the support that such teeth require; but a properly adjusted splint will hold a tooth immovable, and that immobility increases the chances of success. Four weeks ago I implanted that tooth. It appears to-day better than one of the lower incisors in the case shown this evening, and looks as though it had grown there always.

Dr. Dwinelle. In the case which you first described you had to cut away the back portion of the socket?

Dr. Kingsley. Yes, to the full diameter of the tooth.

Dr. Dwinelle. Of course there was a corresponding vacancy in front?

Dr. Kingsley. There was no bone in front left in contact with either of those two teeth except at their upper extremities. That is why I said the case was more remarkable than the one we have seen here to-night.

Dr. Dwinelle. Has there been any new growth of alveolar process?

Dr. Kingsley. I do not know what is going on that is out of sight; but I know this, that the raised process and the original fullness of the gum over it have passed away, and without any surgical operation. It has seemed to sink down until it has come in contact with the roots of the implanted teeth. What is going on above there I do not know. I feel a great deal like using the words of advice that I gave to Dr. Younger, "Do not have any theory; let other people form their theories; you state facts." These are facts. People can make their own theories.

The President. Will Dr. Perry give his views concerning the implanted teeth he has just seen?

Dr. Perry. They are in such condition that I should have imagined that they had belonged to this young man since he was a boy, and grown with him as he grew. I can see no difference between the

two teeth that were implanted and their neighbors. I am not one of those who have grave doubts as to the future of this practice, but have the faith to believe that these new teeth are going to be naturalized and become good citizens. Dr. Kingsley says these things are facts. They are facts. It seems to me that this is the most impressive, as it is the most gratifying, fact in modern dentistry. I do not know of anything in our specialty so promising or so wonderful as this. I am very sorry that Dr. Weld is not here to see with his own eyes what we have seen to-night, for if he were I think he would hardly take so gloomy a view of the possibilities in this direction as he seemed to the evening Dr. Younger read his paper before us. Those of you who have seen a recent number of the *Independent Practitioner* may have noticed a short article by Dr. Miller, in which he details some interesting experiments pointing in this same direction. He found that pieces of dentine that were implanted in the abdomen of rabbits became thoroughly attached and a part of the tissue in which they were implanted; that is to say, those portions of the dentine of teeth that were covered with pericementum. Other portions that were denuded of that pericementum did not become attached. From the appearance of these teeth, and from their solidity, I believe they have become firmly attached.

Dr. Kingsley. The tooth which I implanted is one that I offered to Dr. Younger when he was here for the purpose of implanting. He declined to use it, on the ground that he would not trust a tooth which had been incased in plaster for seven years. I told him I could not see that it would make any difference; but rather that it was perhaps one of the best ways in which teeth could be kept. Another point that I wish remembered is in reference to the teeth that were removed from the mouth of the lady and replanted in new sockets. One of them had no membrane upon it, while the other was well covered, yet those two teeth are now equally firm.

The Secretary read the following communication from Dr. Geo. L. Parmele, of Hartford, Conn.:

"The following case, which I beg leave to report, is to me unique, having never met its like in practice or dental literature. Should others have done so, which is not at all unlikely, will they please report them, that they may go on record? E. A., aged nine, consulted me November 10, 1886. I found, in cleaning the superior front teeth, that it was almost impossible to raise the lip enough to see the cervical portions of the central incisors. Examination showed that the frænum labii superioris extended much lower than usual, dipping with the gum between the centrals half way to their cutting edges. I discovered also that, owing to this malformation, which held the lip closely adherent to the teeth, she was unable to

properly clean them, and that we were none too soon in making the discovery, for there were already signs of early disintegration. After bathing the frænum for a few minutes with a solution of hydrochlorate of cocaine, I removed with scissors a V-shaped section of the frænum, which liberated the lip and restored the parts to a normal condition."

The President. Gentlemen, if there are no other "Incidents" to be presented, we will proceed to the discussion of Dr. Bonwill's paper on "The Herbst Method." Dr. Lord has kindly consented to open the discussion.

*Discussion.*

Dr Benjamin Lord. It will be remembered that at the last meeting, when Dr. Bonwill read his paper on "The Herbst Method," there was not time for much discussion of the subject. This being the case, it was felt by some that it was due to the essayist as well as to ourselves that the question should be considered at a future meeting. It was also felt that it was due to Dr. Herbst that there should be further expression of opinion and judgment upon his method, as he distinctly said that the principle might stand or fall upon how it should be received by the dentists of America. Another reason has been given or spoken of as to why there should be a more full expression of opinion here, which is that, as Dr. Herbst received so much attention during his visit to us, many would raise the question as to whether the unusual cordiality and attentions that he received were due to the excellence or superiority of his mode of filling teeth or to himself as a professional brother visiting us from a foreign country. I may say just here that there has been a little fear on the part of some that the further consideration of this question would be taken as more or less personal and antagonistic; but I don't believe that there is the least feeling of that kind,—the only object is to say what we think of the rotation method of filling teeth with foil, either tin or gold, and it would seem, from all that has been said and written, and our relations to the whole subject, that this much was incumbent upon us. It is very pleasant indeed that every one is ready to acknowledge that Dr. Herbst showed many great excellences of character as well as large resources in mechanical skill, and it was fitting that we should have extended to him a good deal of kind and polite consideration. He believed that he had a new and a great thing in its way, and at great expense of time and money, with a noble generosity, he came from over the sea to show it to us and to submit it for our approval or disapproval, and all with great modesty and propriety of manner and spirit.

I don't know at all what will be said this evening on the subject,



nor do I know much about the views or experience except of a very few of my fellow-practitioners in regard to this particular method of filling teeth; but I will say for myself that from what I saw of it, and from all that I know of that principle of manipulating and packing foil, I was not favorably impressed with it. It is not very safe, I am aware, to say much in condemnation of any particular method or manner of filling teeth, provided the results are satisfactory, as almost every dentist has some peculiarities in his mode of operating. Indeed, it would seem that the practice of dentistry strongly develops individuality both in methods and the kind of instruments used. I do not propose to go over very much of the ground of this discussion, or to say much about other ways of filling teeth in comparison to this, but to give some of the objectionable and weak points as I understand them. I may say, first, that I consider the necessity for forming a wall in filling approximal cavities by the use of matrices and other auxiliaries a serious objection, as I regard the matrix in most cases a useless and misleading appliance. Then these preparations consume a great deal of time, and are a great annoyance to the patient. I believe it is far better in nearly all cases to build the wall with the filling material used as it is placed and impacted against the existing walls. The whole operation will thereby be made more accurate and satisfactory. It may be admissible or even useful in some cases to place quite a narrow matrix at the cervical wall, but if the appliance possessed any considerable width it must obscure the view of the margins of the cavity, and thus embarrass both the seeing and feeling in regard to the accuracy of the margins of the fillings as the work progresses. I believe that the engine and rubber dam are necessary appliances in the rotary method. To my mind any plan of filling teeth that requires the very general use of these appliances is objectionable, as I believe that both should be dispensed with just as much as possible in all our operations. There can be no question but that a favorably situated cavity—one of plain shape, not too small nor too shallow—can be filled by the rotation method; but the same can be done by hand instruments just as well, more simply, and quite as quickly. It is very much to be feared that many think the rubber dam covers almost everything, that it secures perfect operations, and therefore is made a leading feature in dental practice. I believe it is used far more than is required, and that without it the work may be done equally as well, with a saving of time to the operator and a good deal that is distressing and disagreeable to the patient. The fact that a large proportion of the cavities that we meet with are so inaccessible from various causes, and thus impossible to get at in a more or less direct line, without cutting away and thus sacrific-

ing much sound tooth-structure,—which in the main I consider bad practice,—is a serious objection to the rotation method of filling, as only straight instruments can be used. Again, as I understand, in attempting to fill in the approximal surfaces of the front teeth, it is required to cut away some portion of the labial wall in order to get the instrument between the teeth and into the cavity, even if there exists the separation ordinarily required, thereby defacing the tooth and causing the filling to show much more than it would if the work should be done by suitably curved instruments. Taking all the conditions that we meet with, and all localities in which we find cavities in the teeth, it would seem and it must be that the number of cases are very limited to which this method is adapted. This of itself is a strong objection. I believe that it is acknowledged by those who favor the Herbst method that it is not suited to finishing either the edges or surfaces of the filling—that this must be done by the hand instruments or the mallet. As I watched Dr. Herbst in his manipulations, I observed that he was careful to examine frequently with a hand instrument to determine whether the gold was well condensed against the walls of the cavity, and also as to the condition of the margins as he proceeded evidently distrusting the rotating tool to do the work with the required accuracy. Then much of the time and for a large part of the operation he had recourse to the hand instrument; in fact, he used it and depended upon it, I thought, quite as much as he did upon the revolving one. I think I cannot be mistaken when I say that as I saw Dr. Herbst operate there seemed to be a feeling of distrust in his own mind as to whether he was progressing satisfactorily or with the accuracy which he desired. I do not know whether or not it is required or is the usual custom to warm or heat the gold in the rotation method, but Dr. Herbst did when I saw him operate. I wish to say that I consider it a great mistake to heat or warm the gold, except in cases when it is desirable or required to make contour fillings, and then to use cohesive gold only to build beyond the margins of the existing walls. The gold being made sticky or cohesive by the heating, it does not work so kindly in the cavity—becomes hard too quickly in the placing of the pieces, whatever their form, and hence the impacting is much more difficult and the accuracy uncertain. I can but believe that much better results would be obtained if soft or non-cohesive gold was used generally within the cavity proper. We can easily and securely pack tin foil so as to make an oval surface sufficient to restore the natural shape of the teeth if the breaking down of the margins of the cavities is not considerable. Then why not use non-cohesive gold the same as we use tin foil? If we should we will get like results. It is very certain that every thinking,

right-minded dentist would hail with the greatest interest and delight any method or any improvement from any quarter that would help to overcome the difficulties and make more certain the filling of teeth with gold, but I don't believe that the much talked about "Herbst method" will ever be accepted as an improvement to that end.

Dr. W. H. Dwinelle. I feel as though Dr. Lord had been into my library, stolen my ideas, and anticipated me altogether, so I will have to start off in some other direction. We are here to-night to discuss the relative merits of the system of malleting as practiced by Bonwill and the Herbst method. The presumption is that they are antagonistic. So far this evening it seems that the discussion has been on one side; the Herbst method alone has been considered, in antagonism to the various methods of malleting. In reference to the politeness and attention that were extended to Dr. Herbst while here, I have to say that there has been a mistake in reference to it. Too many have considered that the attention that we gave to the man was an indorsement of his system; while really it was the man that we extended our courtesies to, and not the method. I have been accused of having indorsed Herbst and his method together. The fact is that I have been particularly cautious in my remarks, merely saying that his system was mainly new and peculiar to us, and that it became us on the part of prudence and wisdom not to be too hasty in adopting it as a system; that its value to us was a matter for time and experience to determine. Dr. Herbst certainly is a man of genius, and a great acquisition to our profession. I recollect saying on one occasion that we old fogies would not be likely to adopt his system as a whole, though we might adopt it as an auxiliary or supplementary matter. To that opinion I still hold. Something like the Herbst method has, as most of us know, been in practice for a long time. The planishing method of forcing gold to its place has long been in vogue, and the method of working gold by rotating small burnishers with the hand for the purpose of forcing the gold against the walls of the cavity, has also been in use. Several systems pointing this way have been familiar to us. Nevertheless, Dr. Herbst is entitled to great credit for bringing the matter to a systematic method or process by which it has been brought to its highest expression. His method in my hands justifies me in saying that ultimately it will supplement our operations, for I have not only found it useful in various ways to condense the gold, but also for assuring myself of the uniform solidity of the gold impacted. I find it useful not only in conjunction with the Wolrab gold, but also with the ordinary foil, both adhesive and soft, but especially with soft foil in the form of pellets. I have also



made large and most perfect fillings by the Herbst method with crystal gold alone.

There is one objection to the Herbst method which will always militate against its success, and that is that the force must be applied in a *direct* line with the posterior and lateral walls of the cavity. You cannot bring the instrument to operate against the under-cutting anterior walls; therefore it is impossible for it to subserve every purpose in packing gold. Dr. Herbst seemed to be aware of that fact, for he was continually resorting to the old instruments and the old forms. In doing this he virtually admits that the anterior portions of certain cavities could not be properly reached with his burnishers. Although Dr. Bödecker assured us that he constantly uses it in all kinds of cavities, I think I am safe in saying that a certain class of cavities cannot be filled successfully with the Herbst instruments exclusively.

It must not be forgotten that we are under many obligations to Dr. Herbst for his numerous valuable improvements and ingenious devices, most of them new to us. Nothing stands more prominent before my mind at this time than his method of lining cavities with gold at the beginning of operations by means of cotton. He first introduces his gold in broad masses, giving it a general location. He then places a given quantity of cotton into the cavity, and upon this he places his agate burnisher, rotating it under pressure over the entire surface. On removing the cotton he finds the cavity beautifully lined with gold, every part being enforced and established against the remotest elevation or depression of the walls of the cavity. This gives us great advantages, especially at the outset of our operations. Dr. Herbst uses this method for lining frail cavities of front teeth, and afterwards filling them with amalgam when economy must be practiced. In this way he is insured against discoloration of the teeth.

It is unfortunate that neither Dr. Bonwill nor Dr. Bödecker is here to-night to defend their methods and to aid us in discussing the paper for our consideration. It is impossible for us to discuss a paper read so long ago; we cannot carry its salient points in our minds. Dr. Bonwill has probably done more to bring the malleting system by machinery to perfection than any other man, and he is entitled to great credit for it. With his mallet I have seen him work with great facility and thoroughness. I witnessed the operation of his at Asbury Park last summer, to which he refers in his paper, and I can testify that he executed the two fillings he referred to in the time he specifies. They are both examples of beauty, skill, and perfection. But, on the other hand, they both could have been filled as well by other methods, even by hand-pressure. Again,

there are certain teeth that cannot be filled with the mallet; they will not bear the first percussion blow. There are times when we have to be eclectic in our practice, adapting means to ends, and blending and adjusting one method with and to another. When Dr. Bonwill was here and gave us illustrations of his methods and systems, he referred to tests which he had made, and showed us some gold that had been impacted in cavities and afterwards removed from them in the form of nuggets and then reconverted into foil. He showed other specimens that had been rolled out, that were inclosed between plates of glass. These specimens were produced as tests of the impacting quality that was given to the gold by his system of malleting. I do not regard these as tests at all. If the gold had been imperfectly impacted, and then subjected to the rolling-mill, the very process of passing them through the mill would impact them and resolve them into a unit. And so the credit that he attributes to the mallet might more properly be attributed to the rolling-mill. You may take a soft and very imperfect filling, anneal it and pass it through the mill, and it will be immediately condensed into plate. It is therefore no test at all. The only true test is by its specific gravity. In conclusion, I would like to say that after all it is not the material nor the instrument that gives us surety of good operations; it is the man behind the instrument and behind the material—the genius that directs the whole; for a man of true genius will take comparatively imperfect implements and produce results that the best instruments in the hands of a novice cannot produce.

The President. Will Dr. Atkinson have the kindness to say a few words on this subject?

Dr. W. H. Atkinson. I have always been an advocate of an open field for the exhibition of any device or invention that tends to the furtherance of our interests. To pronounce hasty judgments upon them I do not regard as wise, for the reason that each individual's judgment is made up of his separate experience. Principles are not sufficiently formulated into texts so that mere words can make them understood. There must be an educated hand to obey the intent of the mind in every mechanical operation that we have anything to do with.

I am much in favor of what I regard as the Herbst method, but when I say that I want to define what I understand the Herbst method to be,—a combination of hand-pressure and of rotary motion. So far as Dr. Herbst's genius is concerned, I have conceded that. If you remember his history, you will recollect that a great many of those beautiful little movements that seemed to be so easy

were accomplishments acquired in another department of mechanics entirely. I admire his honesty in saying that had he known what had been accomplished in America he never would have spent the time and effort that he did to attain the excellence that he has shown. Further than that, he did not consider himself complete, but said he was growing and was to grow. This matter of judging of a man's standing by our interpretation of what he does is a little bit old-fogyish, egotistic, and pharisaic. When we are tempted to judge of any man we should remember the old saying, "By what judgment ye judge ye shall be judged, and with what measure ye mete it shall be measured to you again." How many of us understand that so as to interpret it in its legitimate sense? I think the Herbst method has not been properly appreciated except by a very few. One point that I wish to call your attention to especially is the statement that it is not adapted to finishing the margins of cavities or fillings. If it is useful anywhere, it seems to me that for such purposes it is specially adapted. I was a great stickler for the mallet. That was because of the processes through which I was led to obtain what ability I have in filling teeth. It came to me by inspiration, just as the plasticity of gold came to me through poverty. At that time I could not afford to lose the gold that was spoiled in filling, so I dried it in a spirit-lamp and tried to put it into the central parts of cavities, thinking that by that means I could utilize the gold. It was not that I had such a wonderful erudition about the principles of things, but it was the inspiration of my necessities. I have seen fillings that were made by this Herbst method over two years ago by Dr. Bödecker, on the cutting and approximal surfaces of inferior incisors, and they have stood hard service without showing any evidence of disintegration or leakage. How many of us can say that of fillings made by other methods? That any one method shall be transcendently superior to any other I have not the least idea. As Dr. Dwinelle has said, it is the man behind the instrument and his perception that makes superior work. We are all the time getting sharper in our criticisms, and sometimes less kindly, forgetting that criticism is not fault-finding, but getting at facts.

As to the difference between methods, no man is entitled to pronounce judgment upon them until he has become familiar with the different methods that he is comparing. I know I am a little jughandled. I am an advocate of the dead-blow mallet, faced with gold, or lead, or tin, or something that gives a dead blow that has no recoil to it. I am against a springing instrument, because I know that the law and nature of impaction requires a dead blow. I think it is too soon for us to prophesy what will come of this Herbst method; but according to the development of our understanding of



principles I think we are entitled to judgment more than those who are not acquainted with the principles we are discussing. I do not hold myself as being particularly well acquainted with all the scientific statements of mechanical facts in Dr. Bonwill's paper. There was a great deal in that paper that was very interesting in its way, and that would require a good deal of mechanical engineering instruction to comprehend the whole of.

The other point that Dr. Perry brought up I do hold myself competent to pronounce an opinion upon. That was in regard to the question of what became of the pabulum wept out around the implanted teeth that we saw to-night. I have said that I did not attribute a sufficient pathological knowledge or histological acumen to Dr. Younger to enable him to justify what he said and did; and it struck me as being most favorable that he destroyed all the sick connective-tissue, making opportunity for fresh pabulum to be submitted to the nutrient function according to the new circumstances. We are hardly prepared to go into the discussion of how the substance of the side of a tooth not covered with connective-tissue could be resolved into pabulum, and afterwards what sort of union would be made on that side. As to the connective-tissue at that place being anything essentially different from that found anywhere else, those who understand what constitutes periosteum, peridontium, and pericranium, and who know that white connective-tissue corpuscles make up that membrane, will see at once that the elements of the tissue did not die. They said these teeth were dead. They were not dead. Seeds were referred to as being resuscitated. Not at all. They were simply awakened. It is no more resuscitation than our breathing would be a resuscitation of the breath. Each individual movement in our functions is definite, once for all; we never re-breathe, and the heart never re-beats; it is a new action every time. It is nothing more than a display of the same radiancy that constitutes the energy of the organism, which has been pretty well elaborated in the paper on "Ripening and Ripeness," and which I think has not been read as it ought to be. It may be that when we are all gone somebody will wake up to see the value of that effort, and the profit that would have followed its study and appreciation. The difficulty with us is that we think better than we talk. It may be that we do not all know just what an individual means by the use of his terms. Possibly Dr. Dwinelle understands it as I do if we could but picture our mental states in the cleanest and clearest expression. There is no union between the dead and the living. There is union between that which is living and that which has latent life. There is crystalline life in that marble slab; yet they deny it and say it is inorganic. Our language and nomi-

nations keep us from getting at the best expressions of truth. There is no dead material anywhere. There may be a dead horse or a dead man so far as conscious and systemic life are concerned, but there is organic life, tissual life, corpuscular life, and molecular life still there, and you cannot destroy it.

Dr. Dwinelle. Do you believe that the dry—not to say dead—periosteum, after being inserted into an artificial socket, does ever wake up (I will not use the words resuscitated or resurrected) and join hands with the living tissue about it, and go on with the process of reciprocation by which they are united in harmony?

Dr. Atkinson. Most assuredly. It is reduced to its embryonic state, and when the pabulum is wept out from the capillaries it makes a magma of pabulum which fills the chasm and is converted into the new tissues.

Dr. Dwinelle. You believe that these teeth are supplied with a new living periosteal membrane?

Dr. Atkinson. Undoubtedly. Not periosteal, but pericemental. I am sorry I accepted that even, because it is connective-tissue which goes by that name. It is white connective-tissue that makes the bond of union in all these membranous structures. Even the areolar or loose connective-tissue in which the fat is deposited is made up of one single tissue, and that tissue is this very attenuated white variety.

Dr. Dwinelle. So implanted teeth *may* be made as good as those of natural growth?

Dr. Atkinson. Minus the pulp. And you all know that a very sharp fellow has said that there is no further use for the pulp after the tooth is completely developed.

Dr. Dwinelle. The pulp is obliterated when a man gets to be a hundred years old.

Dr. Atkinson. I have seen the cementum itself entirely removed from the teeth of old persons; the teeth being wasted to a peg of dentine or some other structure. When placed under a lens I could not determine its original character.

Dr. Perry. You regard it probable that these teeth may remain almost indefinitely in a healthful state?

Dr. Atkinson. I hope they will; and hope is made up of expectation and belief, so that in a degree I do believe it. I know teeth that have been in use twenty-five years since they were reset, and, as I have told you before, I have reason in several cases to believe that the pulps have become united. A second bicuspid was reset for one patient, and for twenty years it remained in good condition. I have known other cases that resulted as Dr. Weld's cases did. But to know just why, is a little too much for me. It is only the

how that I try to get at. You remember the Bent case. In that case the teeth were said to be dead. They are now united, strong, healthy, and of good color. I cannot tell the exact condition of these unions, because the patients have not had the grace to die and let me cut them up. I have every hope in the success, as Dr. Perry said, of this implantation, and I believe it to be a marked step in advance. I base that judgment upon knowledge of how tissues behave in health and in disease. I do not want a sick tissue left. If I were implanting a tooth I should cut away all the diseased connective-tissue in the site, and get a good blood-clot for the new production. Our greatest care in regard to the bone is that it shall be healthy and in condition to afford a good socket in which to set the new tooth. I think we have had enough evidence before us in this room to convince any man who knows anything of histology and embryology that there is much to hope for in this direction.

The President. We would now be pleased to hear from Dr. J. P. Geran, of Brooklyn, continuing the discussion of Dr. Bonwill's paper.

Dr. J. P. Geran. I was present when Dr. Bonwill read his paper before you upon "The Relative Merits of the Herbst Method and the Mallet System." Dr. Bonwill always gives us a good paper; sometimes lengthy, but never prosy. I have a few words to say upon the subject, and although I may criticise Dr. Bonwill a little, it will be in the best of feeling, I assure you.

Rev. Henry Ward Beecher once said, "The most distressing thing to some people is anything new." They don't like new ideas. Let the advantage be ever so apparent, these easily distressed persons whom Mr. Beecher had in mind treat new things about as we would an alligator, with fearful respect. And why? Because progress tends to pull up the curtains and let in light upon our idols; to tear off the shroud of self-conceit in which we are apt to wrap ourselves. The birth of a new idea in dentistry has to run the gauntlet of critical opposition as severe as that applied to Stephenson's first locomotive, and to the master thought of Morse, who converted the electric spark into a universal language, for his alphabet is to-day studied by every nation. What did the world say of Dr. Jenner's inoculation for small-pox? Simply that he was crazy and ought to be put in bedlam. And to-day Pasteur is sneered at by many learned men, who regard him only and speak of him as a wild surgical theorist.

Aware of the human tendency to depreciate, Dr. Herbst, a German dentist, came among us with his invention. He had mastered an idea in dental science. If you wish, we will say it was his only idea;



that he was ignorant of other methods than this one. But he knew it was eminently practical, for he had carried it beyond the experimental stage, and believed it would recommend itself to the coming generation of practitioners, if not to the men of to-day. I am free to admit that the more I investigate and experiment with his mode of practice the more am I satisfied of its value. My conviction is that practical men everywhere will only need to understand it in order to adopt it as one of the methods. There is, however, a certain stolid opposition which seeks to prevent its general adoption. Thus, Dr. Bonwill in his paper said, when alluding to Herbst's method, "Have I, like Rip Van Winkle, been asleep these thirty years, and on awakening find nothing changed except time?" intimating that Herbst's was the old system of hand-pressure. But Herbst's method is entirely different from the old plan. With the Herbst method it is only necessary to use enough pressure to hold the gold in position, the same as with the mallet, and when the attachment is made the twirl of the hand or rotary instrument makes the adaptation, condensation, or solidification. The soft, pliable gold is forced into every cavity and crevice, and the filling, owing to the cohesiveness of the metal, becomes a perfectly homogeneous mass.

But Dr. Bonwill insists that "*we* ought not to adopt the method because America stands at the head of the dental profession in the world." In other words, that we ought not to adopt foreign ideas! This looks like prejudice. Dr. Cole, you will remember, said at the last meeting of this society that "Germans theorize and Americans apply." It is this very faculty of application that has placed us at the head of the profession. There are others besides Americans who think out and work out great problems in dental science; and, as time rolls on, thinking men and ideas multiply. Again, Dr. Bonwill says he is "glad the profession has discarded hand-pressure." Now, why is he so happy? May it not be because he is an inventor, interested in the sale of his instruments? I say Dr. Bonwill is entitled to great praise for his indomitable perseverance and ingenuity! Dr. Bonwill spoke slightly of the matrix, though he must know what an important appliance this is to the profession, and how indispensable it has become to many operators. How important, also, is that simple contrivance introduced by Dr. Herbst, with its brightly polished interior surface which serves as a speculum, lighting up the cavities of the teeth so thoroughly. Then Dr. Bonwill intimates that if the Herbst plan prevails all his "thirty years of labor will come to naught." Well, he is not the first man who has conscientiously labored for many years, and after all found himself on the wrong track! When Dr. Bonwill says he "will not give up the mallet," one is tempted to say, "Doctor, don't be so wedded to your own inventions that you cannot see the usefulness of the inventions others."

Among other advantages the Herbst method materially lessens the suffering of patients in the dental chair. Take, for instance, a sensitive, nervous patient, and treat her or him with the Bonwill instrument. To say the least, it is brain-racking, if indeed it is not nerve-destroying. The continuous blow and recoil of the instrument is irritating and uncomfortable. Now, suppose you replace the Bonwill with the Herbst instrument. The easy pressing motion is noticed at once; irritation ceases, and the operator can proceed with the process of filling without interruption or opposition. I defy any candid person to try both methods without deciding in favor of the Herbst. As an old practitioner, I simply wish to take advantage of whatever is best for myself and my patients, and I avow my preference for the Herbst method where it can be used, because I have practical evidence of the value of the idea he has presented.

Now, in conclusion, let me say that experience teaches us that almost all metallic substances, and especially gold, become hard by burnishing and rolling. Jewelers, in making a close-fitting setting, use a pointed burnisher to force the gold down on the stone. Whether the stone has a smooth or rough and irregular surface, the gold forming the setting will be so closely fitted that neither air nor moisture can penetrate to tarnish, discolor, or destroy. This being true, does it not seem reasonable that the pointed rotating burnisher should do the same in condensing around the walls of teeth, especially when we take into consideration the softness of the material and its easier adaptation than the 14, 16, or 18-carat gold which the jewelers use? I cannot help thinking so!

Dr. C. F. Ives. I wish to say a word in regard to the specimens of gold which were presented by Dr. Bonwill when he read his paper before us. I do not think anyone was very much surprised at the results obtained by him in his experiments. It struck me so forcibly that I have had two specimens prepared. On one side of this case is a sheet of foil beaten from a plug which was packed into a hole in a tooth-brush, no pains being taken with it. It was put through the mill and then beaten out. The other is a sheet of foil folded over and over and then beaten. You will see that good results have been obtained in both instances; therefore I do not think there is anything really wonderful in this connection.

Dr. Geran. I have here a specimen made from a filling that I removed about six years ago. I imagine that it has a non-cohesive filling, as it was in many pieces when removed. I placed it between pieces of parchment, or gold-beater's skin, and pounded it, first annealing it, and then passed it through the rolling-mill. You see the result is good. The small piece is White's crystal gold, which I squeezed in my fingers and then passed through the mill.

The President. Before adjourning we will listen to Mr. Morse for a few minutes while he explains the advantages of the storage battery, motor, etc., made by the Gibson Electric Company.

Mr. Morse here exhibited the storage battery, motor, and electric light, and explained their operation.

Adjourned.

S. E. DAVENPORT, D.D.S., M.D.S.,  
*Editor N. Y. Odontological Society.*

### FIRST DISTRICT DENTAL SOCIETY, STATE OF NEW YORK.

THE First District Dental Society of the State of New York held a regular monthly meeting, Tuesday evening, January 4, 1887, in the rooms of The S. S. White Dental Manufacturing Co., Broadway and Thirty-second street.

The president, Dr. William Carr, in the chair.

Dr. C. F. W. Bödecker, chairman of the Clinic Committee, reported as follows:

Mr. President and Gentlemen: We had a very interesting clinic to-day. There were between sixty and seventy present. Dr. G. M. Evans, of New York, explained his method of making all-gold crowns, and crowns with porcelain faces. The gold crowns are the most natural of any that I have ever seen at the clinics. Dr. Evans showed how to strike up the grinding surface of a crown in eight minutes by means of Melotte's metal and "Moldine." . . . Dr. W. I. Thayer filled a right upper second bicuspid in the mesial and grinding surfaces with Kearsing's soft foil, No. 4, rolled into the form of a rope. The first part of the operation was made with his new trip-hammer, but suddenly the right-angle of the mallet broke, and the rest of the operation had to be performed with the hand mallet. Dr. Vanderpant, of Orange, N. J., presented a lower set of Ash & Sons' English diatoric teeth, mounted in cheoplastic. . . . Dr. Reese exhibited an upper set of teeth mounted upon Reese's metal. . . . Dr. Crowell exhibited a partial continuous-gum set. . . . The report of the Clinic Committee was ordered to take the usual course.

Prof. Frank Abbott, M.D., read the following paper, illustrating his subject with drawings:

#### A CONTRIBUTION TO THE STUDY OF THE MINUTE ANATOMY OF ENAMEL.

Dr. Geo. W. Weld, in a paper entitled "The Destructive Energy of the Tincture of the Chloride of Iron on the Teeth: an Experimental Study," read before the New York Odontological Society,



June 8, 1886, and published in the *DENTAL COSMOS* for October, 1886, page 627, draws attention to a novel method of treating enamel for the purpose of decalcification. Subsequent to the reading of the paper he said: "I now wish to call attention to the action of one other acid upon the teeth,—viz., acetic acid. A six per cent. solution of acetic acid affects the teeth precisely in the same manner apparently as a six per cent. solution of hydrochloric acid, differing only in degree; and yet, when we come to experiment with these two acids, we obtain, by reason of the difference of their degree of destructive energy, very different results."

Dr. Weld minutely described how a specimen (thin slab) of enamel previously treated with a six per cent. solution of acetic acid, while watched under the microscope, in consequence of a jarring of the instrument, became broken in pieces, and the enamel-rods isolated, so as to resemble a "bunch of sticks." He asserts that "this method will perhaps ultimately be the means of throwing some light on the matter of the distribution of lime-salts and living-matter in the enamel," but does not follow up the study as far as is known. He further says: "I do not, at the present time, desire to say positively that the enamel-rods are composed of phosphate of lime, and that the intermediate cement-substance is composed of the carbonate of lime, but the inference from this and other experiments leads to that conclusion; otherwise how is it possible with a six per cent. solution of acetic acid, which does not destroy organic matter or animal tissue, to separate the enamel-rods?"

Before beginning the subject of my paper I wish to give Dr. Weld full credit for the important addition he has made to the methods of treating enamel for microscopical purposes. In all writings dwelling upon the minute anatomy of this tissue we find allusion made to its treatment with dilute hydrochloric acid, for isolating and bringing to view the enamel-rods. Most of these writings have illustrations of the rods thus isolated, in which the transverse bars in the rods, as well as the boundaries between the rods themselves, are marked by single lines, without any intervening cement-substance. Such specimens were undoubtedly obtained from dry teeth; and the conclusion arrived at by the observers was almost necessarily that the enamel-rods were put together without any intervening cement-substance; that the enamel as a whole was not a tissue, but merely a deposition of lime-salts (phosphates and carbonates), in a crystalline condition. One of the most recent American writers upon this subject emphatically states that enamel is not a tissue, but a "coat of mail" merely.

Dr. Bödecker, in 1878-9, in his paper entitled "The Distribution of Living Matter in Human Dentine, Cement and Enamel," first

positively announced that these enamel-rods are separated from one another by interstices; that these interstices contain delicate fibers of living matter; that offshoots of living matter traverse the enamel-rods, through transverse interstices, crossing the rods in a far more delicate arrangement, and much more frequently, than had ever before been supposed. His method of preparing his specimens was new, and I believe original. It consisted of grinding freshly-extracted teeth under water. After studying his specimens, I became convinced that his views were correct, and that his method of preparing his specimens was far superior to any that had before been adopted. In my studies of "Caries of Human Teeth," I prepared my specimens in this manner, and obtained most satisfactory results. It so happened that on one occasion, having placed two specimens into a one-half per cent. solution of chromic acid, for the purpose of slightly decalcifying them, I unintentionally left them in the solution over night. In the morning, to my surprise, I found that they had become entirely decalcified, and my beautiful specimens of caries of enamel were ruined. However, I concluded that they were worth mounting, which was done, and upon placing them under a power of five hundred diameters, I discovered that a delicate reticulum or frill of organic matter was left, where the night before the enamel had been intact. I at once communicated this discovery to Dr. Bödecker, who mentioned the fact and credited me with the discovery in the paper above referred to. Subsequently, in grinding specimens of temporary teeth, I accidentally ground a section of enamel, as I thought, too thin, fearing it would break into pieces in mounting. I succeeded, however, in securing it upon the slide as I desired, and upon placing it under the microscope I found that I had "knocked out" the enamel-rods in one part of the specimen, leaving the organic portion protruding some distance, independent of lime-salts altogether. I published this in a paper entitled "The Minute Anatomy of Dentine and Enamel," in the DENTAL COSMOS for August, 1880.

From all these facts, revealed by the most painstaking research, it is natural to conclude that we have some right to claim to have some knowledge, at least, of the structure of this tissue. While it is extremely rich in lime-salts, still it is endowed with a perceptible amount of living-matter, which has apparently escaped the attention of other microscopists and chemists. If, after eight years, with these facts before them, there are still writers who take the ground that enamel is nothing but a "coat of mail," and entirely lifeless, in my judgment it simply means that they are unable or unwilling to observe with the microscope what is plainly visible to an experienced eye. All observing dentists must, as a clinical fact,

have had many experiences which have convinced them that the enamel is a living tissue. Dr. Bodecker's as well as my own specimens had been treated more or less with chromic acid, and in reviewing them I will admit that it takes a certain amount of experience in the use of the microscope to see what there is to be seen. Dr. Weld has now, however, given us a method by means of which even a partially educated eye can observe that which it seems to me must convince any one unbiased, that the description so beautifully given and illustrated by Dr. Bodecker in 1878-79, of the structure of this tissue, is correct. The method as I have used it is as follows: A freshly-extracted tooth, or one placed in dilute alcohol for a time, immediately after its extraction, is ground under water as thin as practicable; then placed in a six per cent. solution of acetic acid, and left there for at least twelve hours if the specimen be very thin, or for eighteen hours if slightly thicker; the acid is then poured off and the specimen repeatedly washed with distilled water; then placed in a concentrated ammonical solution of carmine for twelve hours. After its removal from the carmine solution it is again washed with distilled water, and the enamel detached from the dentine with two needles. This process is easily accomplished, but a slight frill of the organic substance of the enamel is usually left attached to the dentine, and we obtain the enamel itself in small pieces. I have used two other reagents, viz., a one-half per cent. solution of chloride of gold, and a one per cent. solution of hyperosmic acid. The specimens are subjected to the action of the former from twelve to twenty hours, and to the latter from one to three hours; after which they are carefully washed with distilled water; then treated with the acetic acid solution as before stated. They are again washed; then mounted in glycerin, care being taken that they are not broken during this part of the process, their weakened condition from the action of the acetic acid having rendered them very brittle. Such a specimen, when viewed with a power of from four to five hundred diameters, presents the following features: The enamel-rods are plainly recognizable (running their usual way, slightly wavy near the dentine, and straight toward the periphery), owing to the fact that the interstices between them are widened. Another feature presents itself which is quite striking,—viz., that the cross-bars within the enamel-rods are also widened and plainly marked.

We often meet with specimens of enamel where, toward the dentine, the rods are entirely lacking, or very indistinct, and much narrower than those a little distance from the dentine. Should the bundles of rods assume a fan-shaped appearance, as is sometimes seen in the neighborhood of the dentine, the interstices between



such bundles may be found filled with a granular material, or with oblique or transverse sections of rods, occupying comparatively a small field. This latter appearance has undoubtedly led previous observers to conclude, and to make the statement, that the enamel is composed of interlacing bundles of rods. In a longitudinal section of enamel we find comparatively few transversely-cut bundles of rods; whereas obliquely-cut bundles are met with quite frequently. This fact leads to the conclusion that the appearance of interlacing is simply due to the presence of bundles of rods running in a more than usually wavy course, but never transversely to the general direction of the rods. The above description is what is seen in a moderately thick specimen of enamel, and the question naturally suggests itself, How has the six per cent. solution of acetic acid acted upon the specimen to produce such an appearance? The celebrated German chemist Fresenius, according to Dr. Weld, states that acetic acid *destroys* the phosphate of lime, by which it is probably meant that it *dissolves* it. Dr. Weld adds: "This is true so far as strong acetic acid is concerned,—*i. e.*, acetic acid of the officinal strength (36 per cent.). The point to be noted in this connection is that a six per cent. solution of acetic acid does not act on or destroy the phosphate of lime, but does completely *destroy* the carbonate of lime." From the experiments and observations I have made, I am obliged to take exception to the above statement, and the conclusions derived from it, from the fact that I have found that a six per cent. solution of acetic acid does dissolve both the carbonate and phosphate of lime of the enamel,—the former more readily, if reached directly, probably, than the latter. This, however, I do not conceive to be the case in sections of enamel. The suggestion of Dr. Weld that the interstices between the rods may be filled with carbonate of lime, or that the rods are held together by a carbonate of lime cement, is, to say the least, misleading. It is well known to all observers in this direction that interstices between the rods exist, and are plainly visible in enamel specimens, not treated with any acid whatever.

The manner in which the acetic acid acts to produce the widening of the interstices, in my judgment, is as follows: In the process of grinding the edges or borders of the rods are more or less exposed in every specimen, and probably the organic basis-substance is more or less disturbed. The edges being thus exposed to the action of the acid, the same as the ground surfaces of the rods, are dissolved away, and the interstices become widened, while the flat surfaces of the rods themselves are not perceptibly affected. This serves to explain also the widening and bringing so distinctly to view the "cross-bars" in the rods, which also contain a minute

amount of organic matter. Thin specimens of enamel treated with the same solution of acetic acid, if viewed with a power of from five to six hundred diameters, clearly establish the above facts, since we can invariably trace all degrees of dissolution of lime-salts, from a slight widening of the interstices to the coarse granulation of the rods, then to the fine granulation, with the preservation of their general appearance, and finally down to their complete disappearance, nothing being left but the organic portion. The appearance in the field of the microscope is now very striking, it being finely granular, pale, and traversed by innumerable parallel filaments. Even moderately thick specimens may be utilized for bringing to view completely decalcified fields, by exerting a gentle pressure upon the covering-glass. I would not, however, recommend broken enamel-rods for microscopical research, as in my judgment such specimens are entirely worthless. I prefer to confine my studies to shreds in which either the traces of the previous rods are recognizable, or the fibers run a parallel and unbroken course. The foregoing description holds good for the majority of specimens of enamel. There are exceptions, however. Occasionally we find specimens with unusually narrow prisms, or perhaps lacking them altogether, in comparatively large districts. Whether this feature is due to advanced age, malformation, or some pathological condition, I am unable to say. The higher powers of the microscope (1200 to 1500 diameters) give a highly gratifying image of the structure of enamel. Partially decalcified rods appear to be composed of irregular lumps of high refraction, invariably arranged in the shape of irregular squares, which serve to complete the rods; the irregular interstices separating the glossy lumps are traversed by delicate grayish threads. The interstices causing the appearance of cross-bars through the rods are traversed by minute grayish, beaded filaments, sending offshoots into the fields of the rods between them. The longitudinal interstices between the enamel-rods, in many places, show long, beaded filaments, on either side of which we observe a light space. This space again is traversed by conical threads arising from the enamel-fibers, and penetrating the interior of the rods themselves.

In thoroughly decalcified enamel I have often met with a peculiar appearance. Whether carmine, chloride of gold, or osmic acid had been used for staining the specimen is immaterial,—the rods appear to be surrounded by a glossy, smooth, or beaded border, between which can be seen the light interstices. Sometimes there is one such ledge for two neighboring rods, without an intervening interstice. In oblique sections the ledges are best marked on the distal portions of the rods, overlapping their neighbors in a shingle-

FIG. 1.

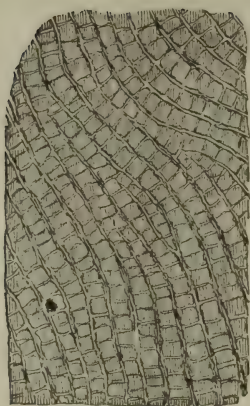


FIG. 2.



FIG. 1.—Beginning decalcification of enamel, by a six per cent. solution of acetic acid. The interstices between the enamel-rods and the cross-bars of the rods widened. The rods exhibit slight organic structure, in consequence of the abundant presence of lime.  $\times 500$ .

FIG. 2.—Advanced but not complete decalcification of enamel, through the agency of a six per cent. solution of acetic acid. The interstices very marked, but not materially widened; their tenants, the enamel-fibers, plainly visible. The cross-bars do not appear in the shape of interstices, but in delicate transverse lines. The organic structure begins to appear, owing to partial removal of the lime-salts by solution.  $\times 500$ .

FIG. 3.



FIG. 4.

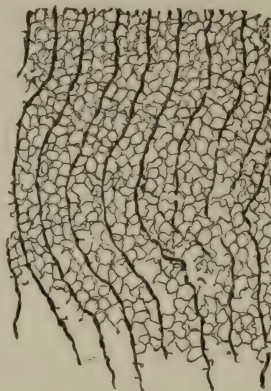


FIG. 3.—Completely decalcified enamel, through the agency of a six per cent. solution of acetic acid, slightly stained with chloride of gold. The upper portion of the figure shows slightly oblique, and the lower very oblique, sections of the enamel-rods. The boundary lines of the prisms are made up of highly-glistening elastic ledges, at the sides of which there are visible oblique sections of enamel-fibers in connection with a delicate grayish reticulum pervading the rods. This reticulum is especially dense in the central portion of the rods, as shown in the lower half of the figure.  $\times 1200$ .

FIG. 4.—Completely decalcified enamel deeply stained with chloride of gold. The enamel-fibers appear in the shape of dark-violet, beaded threads, in connection with a grayish-blue reticulum within the enamel-rods. The transverse threads corresponding to the cross-bars are but slightly marked. In the lower portion of the figure the reticulum is partly torn away, leaving the enamel-fibers protruding rendering them plainly visible.  $\times 1200$ .



like manner; while in transverse sections the glossy border may be seen all around the rods. It is obvious that these ledges cannot be mistaken for the enamel-fibers proper; nor can we conclude that the ledge is an optical phenomenon, caused, as it were, by the thickness of the rods, since the ledge is often found slightly protruding beyond the border of the specimen. The only explanation I can suggest for this is that the borders of the rods are made of a denser kind of basis-substance, kindred to the elastic substance, and similar to that which we observe in the basis-substance of the dentine surrounding the canaliculi. In the center of the rod we not infrequently see a somewhat more compact accumulation of a pale gray substance than in the rest of the rod.

Completely decalcified portions of the enamel exhibit a most beautiful reticulum, especially in specimens treated with chloride of gold, and not the least doubt can arise as to the fact that the enamel-fibers, being the most conspicuous formations, are in an uninterrupted continuity, with the reticulum of living matter pervading the whole enamel.

I am unable to add anything strikingly novel to the minute anatomy of the enamel described by Dr. Bodecker and myself eight years ago; but, considering the incessant attacks upon us, and the doubts expressed by some writers of the correctness of our statements, I have been led to resume the investigation. Dr. Weld's method has borne fruit, but evidently not in the direction he expected. This method is so simple, and its results so plain, that I confidently look for a modification of the views of some gentlemen who are making this subject a study.

#### *Discussion.*

Dr. Carl Heitzmann. Gentlemen, before entering upon the discussion of this paper I would like to denounce my dear friend, Papa Atkinson. There is scarcely a man, including my own father, whom I admire more than I do my friend Atkinson; nevertheless he begins now to call me names. In your last meeting he called me "dogmatic." Dr. Atkinson knows well that I have been engaged in scientific and microscopical pursuits for at least twenty-five years, and that I am not hasty in my conclusions. He knows that when I undertake to make drawings they are done in a rather careful and conscientious way. He knows that a man who is engaged with such subjects is entitled to have his own opinions, and who shall call him dogmatic if he has the courage to oppose views which are contrary to his own experience? I cannot help, gentlemen, opposing some views that were pronounced before you just a year ago by Drs. Williams and Sudduth. In the meantime there has been published

the first volume of a series of books bearing the proud name of "The American System of Dentistry." On glancing through the volume I find an article written by Dr. Sudduth. That article claims to be a mirror of American dentistry and of our present knowledge about enamel. I am not a dentist, but I would be ashamed if we were not further advanced in our knowledge than this article would indicate. Gentlemen, is it possible that a man claiming to know something about microscopy can at this time make the statement, as Dr. Sudduth has done, that the enamel is simply a "coat of mail"? It is the daily experience of the profession and the laity that the enamel is endowed with a certain amount of sensibility, and to say that it is simply a coat of mail is nonsense in the light of our present knowledge. It is the merit of Dr. Abbott's paper to have shown and demonstrated the way that makes it easy for any one to follow and demonstrate for himself that the assertions made eight years ago by Dr. Bödecker were correct.

About a year ago Dr. Williams dwelt upon the same subject, and told us that he did not believe much in the life of the enamel either. Under the microscope we see the well-known enamel-rods, between them the interstices, and in the latter the delicate fibers. Then we meet with oblique sections where the enamel-rods go this way [drawing on the blackboard], and where we observe that the enamel-fibers are short; and at last we meet with transverse sections of the rods, and the fibers seen in the shape of dots.

It is Dr. Bödecker's merit indeed to have shown that enamel is a tissue. Although richly supplied with lime-salts, there is no doubt but that it is a tissue, and endowed with the properties of life.

There are several new facts in Dr. Abbott's paper. We have been accustomed heretofore to look upon groups of transverse sections as being indicative of the interlacing of bundles of enamel-rods. Dr. Abbott denies that, and says there is no interlacing at all, but that these transverse and oblique sections merely indicate a wavy course of the enamel-rods. I agree with this view. I have been struck with the fact that such transverse bundles are comparatively scarce. If it were true that the enamel-rods do interlace, we should meet with them in that form far oftener than we really do. But if it is a fact that some of the rods run comparatively straight and others wavy, if we cut through them longitudinally, those rods which run in a wavy course will necessarily show oblique and transverse sections. He mentions another new fact, that the borders of such longitudinally and transversely-cut rods are a little more compact than the centers of the rods. I have satisfied myself of the correctness of that assertion likewise. It is unknown to microscopists what

constitutes the basis-substance of the rods, but judging from the indestructibility that they exhibit, against acetic acid especially, I would say that the bordering rim is rather kindred to what we call elastic substance. This word merely means condensed basis-substance; more than that we can hardly say in the present state of physiological chemistry. Dr. Weld studied in my laboratory last summer, and he showed me some specimens in which I could plainly see these features, and I, of course, drew his attention to the fact that six per cent. acetic acid will dissolve all the lime-salts of the enamel-rods; but somehow or other I had the misfortune of not being believed in my assertion.

The conclusions Dr. Abbott has arrived at are entirely different from those of Dr. Weld. I think there is nothing easier than to satisfy one's self about the correctness of Dr. Abbott's assertion that a six per cent. solution of acetic acid will dissolve both the carbonates and phosphates of the enamel.

I told you a year ago that after all we knew but very little as to the history of the development of dentine and enamel. I can speak differently to-night. In the last six months Dr. Bödecker has done an enormous amount of work in my laboratory, using teeth of every description,—not only those of the human subject, but those of pigs, cats, rabbits, sheep, and other animals,—and the result has been a highly gratifying one, for to-day I can announce that we do know something of the history of the development of dentine and enamel. I can say that the enamel and dentine are formed just as any other basis-substance is; that the ameloblasts do not form the enamel directly any more than the odontoblasts from the dentine. Before the deposition of lime-salts takes place, both the ameloblasts and odontoblasts break up into medullary corpuscles. I think it will not be a very distant time when Dr. Bödecker will have the pleasure of giving full accounts of his beautiful researches.

Dr. Geo. S. Allan. Mr. President, I would like to say a word. If Dr. Abbott is anything, he is honest and sincere. He is most courteous to everybody, and endeavors to give everyone who may differ from him a fair opportunity to study his slides and his specimens; he allows them to use their own instruments and make their own deductions, and he will not object. I have seen the specimens and slides which Dr. Abbott has mounted; I have studied them carefully, and notwithstanding I may be put under the ban of ignorance and of being unable to see correctly with the microscope, I must say that I am far from convinced that his theory is well founded or will live. I could see nothing resembling the beautiful drawings made by Dr. Heitzmann.

"The American System of Dentistry," which has been published



lately, and which I think most of you have in your possession, contains by long odds the best treatise on the subject that we have ever had put into our hands,—the most complete, the most accurate in detail, and the most careful in preparation. The "System" will live for years to come as a standard work on American dentistry. This subject of the construction of the enamel is a most interesting one, and one which will probably call for more earnest thought and patient toil to investigate than almost any other with which we have to do. I desire to say that Dr. Sudduth does not hold that the enamel capping is simply a coat of mail, containing no animal matter. That I know to be a fact. In the first place, he gives examples of analysis in his essay in "The American System of Dentistry" showing that there is from four to six per cent. of animal matter of some sort or other in this substance; but he does maintain that it is not a living tissue and has no such thing as a reticulum of protoplasm within its structure. He denies that the presence of such a reticulum can be demonstrated, and claims that to all intents and purposes, and the purpose for which nature intended it, it is a coat of mail.

Dr. F. Y. Clark. I did not know that at this late day there was any one within the ranks of our profession who was so far behind and in the dark as to consider the enamel inorganic and nothing but a coat of mail. It can be proven easily that it is organic. It is not necessary to use the microscope to demonstrate that. Eat some grapes or a sour apple and you need not ask whether the enamel is organic or inorganic. Dr. Abbott is most undoubtedly correct in his statement. I do not claim much in regard to microscopical examinations of tooth-structure, but some years ago I made some investigations in that line. I took a small portion of enamel, cut off with the microtome, and placed it on a slide under my objective, and dissolved out the lime-salts with acids, leaving the organic portion on the slide. It is a nice operation, and I think it will give a more-satisfactory view of the organic portion of the enamel than can be obtained by any other microscopical experiment.

Dr. Abbott. Mr. President, it will be remembered, perhaps, by all who are present that a year ago it was very emphatically stated, in one of the papers read before a protracted meeting of this society, that in the opinion of the writer of that paper the enamel was simply a coat of mail. Of course he meant that it was entirely lifeless and composed altogether of inorganic matter; and in order to prove that statement the gentleman quoted from an article which I had published in 1878, or a statement that I had made, that I had decalcified, in the same manner that I spoke of to-night and that Dr. Clark has referred to, a specimen of enamel. I did decalcify that specimen in that manner, leaving the reticulum or frill, as stated in

that paper, and it has been seen by Drs. Heitzmann, Bödecker, Andrews, Allan, and others. The statement was then made that he had gone over this ground, and had found that dissolving the lime-salts of the enamel will destroy every particle of it. That is the ground upon which he stated that the enamel of a tooth is a coat of mail, having no life in it and no organic substance.

Dr. R. R. Andrews. Mr. President, there is no doubt in my mind but that Dr. Sudduth and Dr. Williams have tried hard to solve these questions, and that they are honest in the conclusions they have arrived at. I have seen enough in Dr. Heitzmann's laboratory to-day to convince me that I must make a further study of the structure of enamel. That there is a cement-substance between the rods of the enamel, more marked in some enamel-rods than in others, there is no doubt. I have tried as carefully as I could to demonstrate the existence of the fibers between them with chloride of gold, but I have never seen the fibrils in position as they have been shown in the drawings here to-night, or as I have seen them to-day. There was evidence of what looked like masses of débris between the rods. What they wanted me to see was little blue lines. I was not wholly convinced, as a man cannot be convinced in a day. It is a very delicate tissue, and one must work with a great deal of care and with the greatest illumination. But I have seen enough to show me that there is a field here for investigation. The statement that the enamel is wholly inorganic I cannot accept; neither can I agree with those that think it is simply a coat of mail. I cannot agree with my friend Sudduth, although I believe he is earnest, honest, and scientific, and as anxious to get at the truth as anybody else. I have had a very pleasant and profitable day among the histologists of New York, and I shall remember it with pleasure for a long time. I shall try to work this problem out, and perhaps may be able to say something more definite at some future time.

Dr. Bödecker. Gentlemen, I have to thank Dr. Abbott and Dr. Heitzmann for the work they have done in this direction, the results of which are mostly corroborative of what I published about eight years ago. While studying enamel we had tried in every way to soften the enamel of human teeth, as well as of cats and dogs, but without success. We used hydrochloric acid, nitric acid, sulphuric acid, chromic acid, picric acid, and I believe lactic acid, but we did not use acetic acid. We gave up the attempt in despair. I then proposed to Dr. Heitzmann the grinding of a tooth as soon as it was extracted, but Dr. Heitzmann was so opposed to this method that at first he would not even look at my specimen when I had prepared it. One day, having extracted a molar, I immediately went to the laboratory and put the tooth in a solution of chro-

mic acid, and afterwards ground it and put it on a slide. That was the first preparation of that kind that I have ever seen. There were two or three other gentlemen in the laboratory at that time, and they said immediately that there appeared to be some substance between the enamel-rods. But Dr. Heitzmann at that time would not look at it. He said there could not be anything but dirt that got in by grinding. I took the specimen from the slide, washed it, and stained it with chloride of gold. The next day I got Dr. Heitzmann to look at it. When he saw that I had succeeded in staining the fibers with chloride of gold he began to study it. About four years ago, while there were several objections raised regarding the existence of the enamel-fibers, several of my friends, who are medical men, and some of whom are microscopists, were at my house, and I exhibited those slides, and some of the gentlemen immediately said, if chloride of gold and osmic acid will stain those fibers, there is no doubt but that there is some living substance (protoplasmic matter) in them. Dr. Waldstein, who was a former assistant of Prof. Arnold, of Heidelberg, when I showed him these specimens, without telling him what they were, said, "Certainly there is protoplasm there, for osmic acid will not stain calcific matter. It is utterly impossible to make osmic acid stain calcific matter." At that time I was studying embryology, and constantly showing him my specimens. One night I showed Dr. Waldstein a specimen of the enamel-organ of a human subject, and asked him if he did not think there was connective-tissue to be seen in the middle of it. He said it seemed to be a myxomatous connective-tissue. I told him then, "That is in the midst of an epithelial body. How do you account for its being there? Do you believe that the epithelium can change into connective-tissue?" He said, "Never." Then I asked, "What do you see here?" He said, "It does not make any difference what I see; such a thing is impossible. It may be all right, as I see it, but do not say it, for you will get yourself into trouble." I was with him night after night, showing him those things, and he cautioned me all the time not to tell what I saw. He of course held fast to the old idea that such a thing could not be. I am sure that the gentlemen who deny the presence of the enamel-fibers are just as prejudiced. If they were not I am sure they would interpret what they see in the same manner that we do. Of course, Dr. Waldstein and the others I speak of had no special knowledge about the enamel; they were impartial judges, and they saw immediately and told me that there was protoplasm in the substance they saw; and I know some of them are very good microscopists.

Adjourned.

B. C. NASH, D.D.S., *Secretary.*



**MISSISSIPPI VALLEY DENTAL ASSOCIATION.**

THE forty-third annual meeting of the Mississippi Valley Dental Association was held in Cincinnati, Ohio, March 2, 1887, and was well attended.

President Betty presented a historical sketch of the association. It had its origin in Cincinnati, August 13, 1844, and is now the oldest dental society in existence. Many of the features of the original organization have been adopted by succeeding societies. Its members have been potent promoters of professional progress from that day to this, when twenty dental colleges and universities, thirty periodicals, and thirteen thousand practitioners manifest to an appreciative American public that a higher degree of attainments and skill in the scientific practice of dentistry has been reached than at any previous time in any country in the history of the world. The association claims to be the progenitor of the *Register* and the Ohio College of Dental Surgery, the second oldest dental college in the world. But four of the original members survive,—Dr. John Allen of New York, and Drs. Charles Bonsall, Wm. M. Hunter, and A. Berry, of Cincinnati.

Papers were read by Prof. C. M. Wright, on "Nutrition;" Dr. G. W. Keely, on "Irregularities of the Teeth;" Dr. Dunn, on "Dentistry and Medicine," accompanied by a demonstration of psychism, or hypnotism, as an anesthetic,—the patient, a young man, having a pin inserted in the back of his hand, and walking among the members to exhibit the fact of his insusceptibility to pain in the affected hand. Subsequent discussion brought out the circumstance that hypnotic or mesmeric influence had been employed by several dentists in the earlier days of dentistry for painless extraction.

Dr. A. W. Harlan read a paper on "New Remedies," and Drs. McKellops and How exhibited several new appliances and instruments, which were well received, as was also an electric motor shown by Mr. Leggett.

Dr. J. Rollo Knapp's oxyhydrogen blow-pipe and methods of crown and bridge-work were demonstrated with models and diagrams sent by Dr. Knapp to Dr. How.

Altogether the ancient association had good reason to congratulate itself upon its honorable past and present and its promising future.

The officers for the ensuing year are: A. W. Harlan, president; W. N. Morrison, vice-president; A. G. Rose, secretary; and F. M. Hunter, treasurer.

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**LOUISIANA STATE DENTAL SOCIETY.**

THE annual meeting of the Louisiana State Dental Society was held at Tulane Hall, New Orleans, February 23, 24, and 25, 1887.

The following officers were elected: J. Rollo Knapp, president;

C. C. Martin, first vice-president; P. J. Friedrichs, second vice-president; Chas. Eckhardt, recording secretary; J. G. McCulloch, corresponding secretary; J. W. Adams, treasurer; J. G. McCulloch, Joseph Bauer, E. Telle, O. Salomon, J. S. Knapp, and A. C. Gayle, executive committee.

The next meeting will be held in New Orleans, commencing on the first Wednesday following Mardi-Gras, 1888.

CHARLES ECKHARDT, *Secretary*,  
348 Magazine street, New Orleans, La.

#### CENTRAL DENTAL ASSOCIATION OF NORTHERN NEW JERSEY.

At the annual meeting of the Central Dental Association of Northern New Jersey, held Monday, February 21, 1887, the following officers were elected for 1887-88:

S. C. G. Watkins, president; Geo. E. Adams, vice-president; James G. Palmer, secretary; Chas. A. Meeker, treasurer; B. F. Luckey, W. P. Richards, Oscar Adelberg, C. F. Holbrook, and Jacob Simonson, executive committee.

JAMES G. PALMER, *Secretary*,  
New Brunswick, N. J.

#### FIFTH DISTRICT DENTAL SOCIETY, STATE OF NEW YORK.

The Fifth District Dental Society of the State of New York will hold its nineteenth annual meeting at Utica, on Tuesday and Wednesday, April 12 and 13, 1887.

The meeting will be called to order at 2 P. M., at the St. James, Whitesboro street near Genesee.

Members of the profession from other societies are cordially invited to be present and take part in the discussions.

C. J. PETERS, *Recording Secretary*,  
Syracuse, N. Y.

#### FLORIDA STATE DENTAL ASSOCIATION.

The fourth annual meeting of the Florida State Dental Association will convene at the Opera House, Palatka, on Wednesday morning, April 6, 1887, at 11 o'clock, the sessions to continue until final adjournment.

A cordial invitation is extended to all practitioners of dentistry to attend. The usual reduction in railroad and hotel charges has been secured.

DUFF POST, *Corresponding Secretary*,  
Tampa, Florida.

**ILLINOIS STATE DENTAL SOCIETY.**

THE twenty-third annual meeting of the Illinois State Dental Society will be held at Jacksonville, beginning Tuesday, May 10, 1887, and continuing four days.

A full programme of scientific work is arranged for, including a large and instructive clinic. Dr. Black will give short lectures on micro-organisms with practical demonstrations of their culture. All dentists will be cordially welcomed. J. W. WASSALL, *Secretary*,  
208 Dearborn avenue, Chicago, Ill.

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**TEXAS DENTAL ASSOCIATION.**

THE seventh annual meeting of the Texas Dental Association will convene in the parlors of the Pacific Hotel, Waco, Texas, on the first Tuesday in May, at 10 o'clock A. M., and continue its sessions for four days.

Dentists are cordially invited to attend.

R. P. HAMILL, *Cor. Secretary*, Marshall, Texas.

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**SEVENTH DISTRICT DENTAL SOCIETY, STATE OF NEW YORK.**

THE Seventh District Dental Society of the State of New York will hold its nineteenth annual convention in Rochester, on Tuesday and Wednesday, April 26 and 27, 1887. Dentists of the Seventh Judicial District of the State, who wish to become members, should make application to the chairman of the Board of Censors, Dr. H. C. Knickerbocker, Seneca Falls, before noon of the first day of the convention.

An interesting programme is being arranged. Members of the profession are invited to be present.

CHAS. T. HOWARD, *Recording Secretary*,  
No. 224 E. Main street, Rochester, N. Y.

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**SOUTH CAROLINA STATE DENTAL ASSOCIATION AND BOARD OF DENTAL EXAMINERS.**

THE seventeenth annual meeting of the South Carolina State Dental Association and State Board of Dental Examiners will be held in the Palmetto Guards' Armory (Academy of Music Building), Charleston, S. C., commencing Wednesday, April 27, 1887, at 10 A. M.

A cordial invitation is extended to all members of the profession to attend.

R. ATMAR SMITH, *Secretary*.  
Charleston, S. C.



## BALTIMORE COLLEGE OF DENTAL SURGERY.

THE forty-seventh annual commencement of the Baltimore College of Dental Surgery was held at the Academy of Music, Baltimore, Md., on Thursday, March 10, 1887, at 1.30 p. m.

The annual oration was delivered by Dr. S. B. Bartholomew, and the valedictory by Francis M. Kennedy, D.D.S.

The number of matriculates for the session was one hundred and twenty-three.

The degree of D.D.S. was conferred on the following graduates by Prof. R. B. Winder, dean of the faculty :

NAME.	STATE OR COUNTRY.	NAME.	STATE OR COUNTRY.
A. F. Ambrose.....	Pennsylvania.	A. F. Lantz.....	New York.
S. Ashbrook.....	Pennsylvania.	G. W. McDonald.....	Nova Scotia.
A. E. Barolet.....	Connecticut.	M. M. Mixon.....	Georgia.
J. H. Bitzer.....	Virginia.	E. W. Moyer.....	Pennsylvania.
B. Brodnax.....	Tennessee.	A. L. Munroe.....	Florida.
S. L. Butler.....	Virginia.	W. A. Neece.....	Illinois.
G. W. Conner.....	Kentucky.	F. R. Parramore.....	Georgia.
E. H. Coolbaugh.....	Pennsylvania.	F. M. Poffenberger.....	Pennsylvania.
J. P. Canfield.....	Maryland.	J. B. Powers.....	New Hampshire.
T. W. Cowan.....	Canada.	S. Pugsley.....	New Brunswick.
E. E. Cruzen.....	Maryland.	J. Roach.....	Georgia.
B. W. Cubbedge.....	Georgia.	R. Roach.....	Georgia.
D. H. Day.....	Minnesota.	J. J. Sarrazin.....	Louisiana.
J. S. B. Egan.....	New York.	C. F. Shine.....	Florida.
H. Floris.....	Germany.	I. Standiford.....	Pennsylvania.
G. E. Furbay.....	Ohio.	J. B. L. Swentzel.....	New York.
J. E. Getty.....	Maryland.	W. S. Twilley.....	Maryland.
B. H. Hawley.....	Maine.	G. A. Urling.....	Pennsylvania.
H. B. F. Heath.....	Dist. of Columbia.	H. Urling.....	Pennsylvania.
H. Heime.....	Massachusetts.	S. B. Ward.....	Virginia.
J. N. Hester.....	North Carolina.	G. L. Webb.....	New York.
D. M. Hitch.....	Delaware.	J. Wise.....	Pennsylvania.
F. M. Kennedy.....	Massachusetts.	J. E. Wyche.....	North Carolina.
H. Koenaart.....	Belgium.		

## OHIO COLLEGE OF DENTAL SURGERY.

THE forty-first annual commencement of the Ohio College of Dental Surgery was held in College Hall, Cincinnati, Ohio, on Wednesday evening, March 2, 1887.

The annual address was delivered by Hon. H. P. Lloyd, and the class oration by H. C. Matlack, D.D.S.

The number of matriculates for the session was ninety-two.

The degree of D.D.S. was conferred on the following graduates by G. W. Keely, D.D.S., president of the board of trustees :

NAME.	STATE OR COUNTRY.	NAME.	STATE OR COUNTRY.
A. W. Black.....	Indiana.	J. S. Emery.....	Ohio.
L. A. Brown.....	Minnesota.	J. W. Fisher.....	Kentucky.
L. E. Custer.....	Ohio.	C. H. Green, Jr.....	Indiana.
L. E. Day.....	Ohio.	E. S. Griffis.....	Ohio.
G. H. Doulton.....	California.	M. A. Hadcock.....	Canada.
W. F. Edmonds.....	Kentucky.	B. C. Hinkley.....	Ohio.

NAME.	STATE OR COUNTRY.	NAME.	STATE OR COUNTRY.
T. L. Johnson.....	Ohio.	A. H. Millman.....	Ohio.
E. S. Keefer.....	Ohio.	B. A. Mosbey.....	Indiana.
Miss M. L. Leininger.....	Ohio.	W. W. Reed.....	Ohio.
C. H. Martin.....	Ohio.	F. L. Rice.....	Ohio.
E. S. Mathews.....	England.	J. M. Rutherford..	Ohio.
H. C. Matlack.....	Kentucky.	E. J. Schwartz.....	Ohio.
E. J. McCartney.....	Pennsylvania.	James Silcott.....	Ohio.
B. A. McGee.....	Indiana.	J. J. Werner.....	Switzerland.
C. E. Miles.....	Ohio.		

The honorary degree of D.D.S. was conferred on the following: H. H. Harrison, J. Rollo Knapp, William Knight, M.D., and Wilhelm Herbst.

### PENNSYLVANIA COLLEGE OF DENTAL SURGERY.

THE thirty-first annual commencement of the Pennsylvania College of Dental Surgery was held at the American Academy of Music, Philadelphia, on Saturday evening, February 26, 1887.

The valedictory address was delivered by G. W. Warren, D.D.S., and the address to the graduates by Professor W. F. Litch, M.D., D.D.S.

The number of matriculates for the session was one hundred and sixty-three.

The degree of D.D.S. was conferred on the following graduates, by S. W. Gross, M.D., president of the board of trustees:

NAME.	STATE OR COUNTRY.	NAME.	STATE OR COUNTRY.
E. Herbert Adams.....	Canada.	Lewis S. Goble.....	New Jersey.
Vittorio Adler, M.D.....	Italy.	Frank E. Hendrickson....	New Jersey.
Holstein Bartilson.....	Pennsylvania.	E. R. Hershey, M.D.....	Pennsylvania.
J. M. Briggs.....	Georgia.	Albert F. Hug.....	Illinois.
Reginald W. Bird.....	Kingston, Ja.	Charles S. Holden.....	Massachusetts.
James M. Burke.....	New York.	Charles L. Hill.....	Pennsylvania.
Chas. W. Blind.....	Pennsylvania.	Edward S. Jackson.....	Pennsylvania.
Carolina Bonin.....	Germany.	Adelheid Jacobi.....	Germany.
Luis Campuzano.....	Cuba.	Charles G. Keeney.....	Pennsylvania.
John Robert Conway.....	Minnesota.	Albert G. Koehler.....	Pennsylvania.
Woodfred E. Clayton.....	Canada.	J. A. Kressly.....	Pennsylvania.
G. Carrow Chance.....	Pennsylvania.	J. W. Lambie.....	New York.
James A. Calhoon.....	Pennsylvania.	William C. Mason.....	Pennsylvania.
Lewis H. Chamberlin.....	New York.	Wilhelm T. Muschan.....	Germany.
Bellville M. Crary.....	Pennsylvania.	Frank H. McOmber.....	New York.
William P. Clarke.....	Pennsylvania.	John H. McClure.....	West Va.
R. Melvin Davenport.....	Massachusetts.	Jos. Elias Miller, M.D....	Pennsylvania.
Elliott C. Douglass.....	Connecticut.	William P. Noyes... ..	Maine.
R. A. Dinsmore.....	Pennsylvania.	J. A. Neiman.....	Pennsylvania.
George B. Dodd.....	Wisconsin.	Milville S. Page.....	Connecticut.
George C. Eighme.....	New York.	Edson J. Quackenboss....	Massachusetts.
J. O. Ely.....	Pennsylvania.	Albert S. Rabenold.....	Pennsylvania.
P. Judson Eckel.....	New Jersey.	Orville Rector.....	New York.
Howard T. Eachus.....	Pennsylvania.	Lee Grant Richardson....	New York.
Charles H. Fritts.....	Pennsylvania.	A. Percy Roberts.....	Pennsylvania.
Paul F. Griselle.....	Ohio.	Joseph T. Rowand.....	California.
J. Howard Gaskill.....	Pennsylvania.	David Z. Sahler.....	Pennsylvania.
Alfred Gysi.....	Switzerland.	Peter Jos. Hub. Schwan....	Germany
Frank S. Garrett.....	Pennsylvania.	George H. Seaver.....	New York.

NAME.	STATE OR COUNTRY.	NAME.	STATE OR COUNTRY
William F. Shotts.....	Pennsylvania.	Joseph Vossen.....	Germany.
Casimir Oscar Shulthess.....	Switzerland.	Walter Roselle Vrooman.....	Canada.
Amos Harrington Sibley.....	Pennsylvania.	George W. Warren.....	New Jersey.
William B. Sickler.....	New Jersey.	Clayton W. Wells, L.D.S.,	Ontario, Can.
George B. Smith.....	Ohio.	Walter Hart Williams.....	Pennsylvania.
D. Arthur Smith.....	Pennsylvania.	Camille Wisner.....	France.
Earnest A. Smith.....	N. B., Canada.	Perrie G. Wood.....	New York.
Edw. M. Stroud.....	Pennsylvania.	Frank L. Wright.....	Pennsylvania.
Robert H. Tecklenburg.....	Pennsylvania.	F. D. Yielding.....	Pennsylvania.
Carola Timmermann.....	Germany.	George B. Zell.....	Maryland.
Charles M. Truesdel....	Minnesota.		

### PHILADELPHIA DENTAL COLLEGE.

THE twenty-fourth annual commencement of the Philadelphia Dental College was held at the Academy of Music, Philadelphia, on Friday evening, February 25, 1887.

The address to the graduates was delivered by the dean, J. E. Garretson, M.D., D.D.S., and the valedictory address by George W. Hall, D.D.S.

The number of matriculates for the session was one hundred and ninety-four. The number of graduates was seventy-nine, as follows:

NAME.	STATE OR COUNTRY.	NAME.	STATE OR COUNTRY.
Edson J. Abbey.....	Connecticut.	William T. Jackman....	Ohio.
Eugene Bernhardt.....	Germany.	Charles W. Jarvis.....	Canada.
Clement E. Bill.....	Connecticut.	Frederick E. Judson....	Minnesota.
John A. Bolard.....	New Jersey.	George H. Judson.....	New York.
Edward Bolard.....	Pennsylvania.	Albert C. Kellogg.....	Iowa.
H. E. Brady.....	Pennsylvania.	Charles J. Kinkad.....	Delaware.
Asher S. Burton.....	New Jersey.	Sebastian Lacavelrie...	Cuba.
A. J. F. Buxbaum, M.D.	Ohio.	Marshall H. Lamoree...	New York.
C. L. Card.....	New York.	Julian Landau.....	Germany.
J. de la Cerda y Gomez..	Spain.	Arthur W. S. Loewen....	Pennsylvania.
F. N. Chamberlain.....	Ohio.	Charles H. Lovejoy.....	Indiana.
Mark O. Cooley.....	New York.	Fred. Henry Lyder.....	Ohio.
John C. Curry.....	New Jersey.	J. Hyatt Lyke.....	New York.
Harry P. Derr.....	Pennsylvania.	Alex. Wm. Marshall....	Australia.
B. B. Detwiler.....	Virginia.	Jacob Marquis.....	Pennsylvania.
Ferdinand Dietzi .....	Switzerland.	Joseph McCreery, Jr....	Pennsylvania.
Edgar L. Dow.....	Massachusetts.	Wilson Y. McGown.....	Maine.
William Dunn.....	Italy.	Edward T. McNally....	Massachusetts.
Hobart E. Duncan.....	Iowa.	Hannah J. Mercer.....	Pennsylvania.
L. V. W. Dupuis.....	Canada.	T. R. Morrison.....	Maine.
J. W. Erwin.....	Pennsylvania.	Karl R. von Nauman....	Austria.
Albert P. Fellows.....	Kansas.	Edward O'Neill.....	Pennsylvania.
Frank E. Ferris.....	Iowa.	P. T. O'Reilly.....	Massachusetts.
Samuel E. Frick.....	Pennsylvania.	Charles L. Porter.....	De aware.
Miles D. Glidden.....	Maine.	James J. Rafferty.....	Massachusetts.
George W. Hall.....	New York.	A. Rogmans.....	Netherlands.
Mark E. Harrison.....	Missouri.	Joseph O. Rothwell....	Ohio.
John T. Hinch.....	Maine.	J. Antonio Serrano.....	U. S. Colombia.
James A. Hodgins.....	Canada.	J. Wesley Shaw.....	Massachusetts.
Herbert G. Hodgkins....	Maine.	Orlando B. Shedd.....	New York.
William D. Hughes.....	Pennsylvania.	George H. Smith.....	Pennsylvania.
Edgar L. Hurd .....	Maine.	John L. Stickel.....	Illinois.
Charles S. Inglis.....	New Jersey.	P. F. Struppler.....	New York.



NAME.	STATE OR COUNTRY.	NAME.	STATE OR COUNTRY.
Auguste Sulzberger.....	Switzerland.	Miss Marion Ward.....	California.
Lot D. Sutherland.....	New York.	George T. Ware.....	Canada.
Herbert S. Sutphen.....	New Jersey.	Charles X. Weis.....	Connecticut.
Ernest A. Tripp. ....	Utah.	George B. Williamson..	Ohio.
Charles L. Van Fossen..	Kansas.	T. Frank Windle.....	Pennsylvania.
H. Bernhard Voigt.....	Germany.	William T. Wyckoff....	New Jersey.
Arthur E. Wales.....	Connecticut.		

### NEW YORK COLLEGE OF DENTISTRY.

THE twenty-first annual commencement of the New York College of Dentistry was held at Chickering Hall, New York City, on Wednesday evening, March 9, 1887.

The valedictory address was delivered by George S. Burt, D.D.S., and the address to the graduates by W. A. Purrington, Esq.

The number of matriculates for the session was one hundred and ninety-three.

The degree of D.D.S. was conferred on the following graduates by M. McN. Walsh, Esq., president of the board of trustees:

James Charles Alker.  
George Sumner Burt.  
Gregorio Santos Benet y Llata, M.D.  
Samuel Skinner Brown.  
Valentine Edw. Norman Cook.  
Thomas Alfred Clawson.  
John Harvey Crane.  
John Richard Crawford.  
John Clayton Downs.  
Frank Perry Denny.  
George Anthony Dow.  
Frank John Eversfield.  
William Eybel.  
Samuel Hassell, Jr.  
Erastus Otis Houghton.  
Spencer Cone Hamilton.  
Paul William Hiller.  
Halstead Pell Hodson.  
Ira Daniel Horton.  
Samuel Porter Hopkins.  
Leo Frederic Hugle.  
Frank Alfred Katzmeier.  
Samuel James Kennedy.  
Louis Charles Leroy.  
Frank Butler Longenecker.  
Edwin Parker Marshall.

Francis Joseph McLaren.  
Ferdinand Moith.  
Henry Middleton.  
Lorenzo Noa.  
George Edward Nearing.  
Arthur German Rouse.  
Franklin Willard Rogers.  
Dudley John Russell.  
Horace Reynolds.  
Felix Edmond San Fuentes, Ph.B.  
Thomas Howard Stevens.  
Charles Harvey Smith.  
Harold Slade.  
Preston McCready Sharp.  
Richard James Secor.  
Walter Lincoln Scofield.  
Joseph Daniel Sayre.  
George Joseph Taylor.  
Daniel Webster Valentine.  
Walter Woolsey.  
Herman Eugen Albert Wichert.  
George Mortimer Whitfield.  
John Van Pelt Wicks.  
Ulysses Grant Woolley.  
Leonhardt Eichbery Zuchtmann.

### UNIVERSITY OF MARYLAND—DENTAL DEPARTMENT.

THE fifth annual commencement of the Dental Department of the University of Maryland was held at the Academy of Music, Baltimore, Md., on Wednesday, March 16, 1887.

The reading of the mandamus and announcement of the graduates was by the dean, Prof. Ferdinand J. S. Gorgas, M.D., D.D.S., and the annual address was delivered by Rev. Dr. R. C. Dixon.

The number of matriculates for the session was one hundred and twenty-four.

The degree of D.D.S. was conferred on the following graduates by Hon. S. Teackle Wallis, LL.D., provost of the university:

NAME.	STATE OR COUNTRY.	NAME.	STATE OR COUNTRY.
Julius Albrecht.....	Germany.	C. T. Loving.....	Texas.
Joseph M. Baker.....	Arkansas.	W. M. Meador, M.D.....	South Carolina.
Alonzo A. Bemis.....	Massachusetts.	Samuel McColl.....	Canada.
D. B. Blauvelt.....	New York.	J. A. H. Miller.....	West Virginia.
Garabed Boyajian.....	Asiatic Turkey.	W. C. Miller.....	Pennsylvania.
Charles J. Brawner.....	Georgia.	W. N. Murphy.....	Texas.
Henry E. Chase.....	Massachusetts.	John H. Neill.....	New York.
J. G. Chisholm.....	Alabama.	A. L. de Oliveira.....	Brazil.
Fred. J. Crowell.....	New Hampshire.	H. H. Phillips.....	Pennsylvania.
Henry E. Douglass.....	New York.	P. A. Rambo.....	Georgia.
John T. Eiker.....	Dist. of Columbia.	S. S. Reamer.....	Virginia.
G. McC. Faulkner.....	Pennsylvania.	W. F. Richards.....	Illinois.
W. C. Y. Ferguson.....	Canada.	W. A. Robertson.....	Canada.
C. G. Frantz.....	Pennsylvania.	Cary C. Sapp.....	North Carolina.
Joel N. Furman.....	New York.	E. H. Shields.....	Ohio.
H. Garbrecht.....	Germany.	H. R. Shine.....	Florida.
William F. Gray.....	Virginia.	R. A. Shine, Jr.....	Florida.
L. Lee Harban.....	Maryland.	E. E. P. Sleppy.....	Pennsylvania.
Edwin L. Harris.....	Massachusetts.	P. P. Starke.....	Virginia.
Anton J. Hecker.....	Germany.	R. W. Talbott.....	Dist. of Columbia.
S. W. Hoopes.....	Maryland.	M. W. White.....	South Carolina.
H. V. Horton.....	North Carolina.	Arnold Wietfeldt.....	Germany.
Michael Hourihane.....	Virginia.	H. T. Wilhelm.....	Germany.
Max Jaenicke.....	Germany.	John H. Wilson.....	New York.
Paul Jaenicke.....	Germany.	W. W. Wogan.....	Pennsylvania.
James L. Kean.....	Virginia.		

### MISSOURI DENTAL COLLEGE.

THE twenty-first annual commencement of the Missouri Dental College was held, in connection with that of the St. Louis Medical College, at Memorial Hall, St. Louis, Mo., on Wednesday evening, March 3, 1887.

The number of matriculates for the session was thirty.

The degree of D.D.S. was conferred on the following graduates by H. H. Mudd, M.D., dean:

NAME.	STATE.	NAME.	STATE.
Cline H. Bartlett.....	Missouri.	Albert E. Nichols.....	California.
Howard M. Combs.....	California.	Maurice W. Pearson.....	Missouri.
Edward G. Ellis.....	Missouri.	Sidney J. Smith.....	Missouri.
James A. Meng.....	Missouri.		

### ALUMNI ASSOCIATION.

At a meeting of the graduates of the Missouri Dental College residing in St. Louis, held March 2, 1887, an Alumni Association was organized by the election of the following officers: George A. Bowman, president; Henry Fisher, vice-president; James W. Whipple, secretary; A. H. Fuller, treasurer; Drs. Eames, Harper,

and Fisher, executive committee. All graduates are requested to send their addresses to James W. Whipple, D.D.S., McAdara's Flats, St. Louis, Mo.

### VANDERBILT UNIVERSITY—DEPARTMENT OF DENTISTRY.

THE eighth annual commencement of the Department of Dentistry of Vanderbilt University was held in the University Chapel, Nashville, Tenn., February 24, 1887.

The charge to the class was delivered by Chancellor Landon C. Garland, LL.D., and the valedictory address by S. W. Foster, D.D.S.

The number of matriculates for the session was eighty.

The degree of D.D.S. was conferred on the following graduates by Chancellor Garland:

NAME.	STATE.	NAME.	STATE.
F. M. Alexander.....	Georgia.	S. W. Foster.....	Alabama.
J. J. Austermell.....	Missouri.	J. M. Hale.....	Tennessee.
T. B. Birdsong.....	Mississippi.	E. T. Hardaway.....	Missouri.
B. D. Brabson.....	Tennessee.	Geo. A. Harper.....	Louisiana.
W. H. Caffey.....	Alabama.	L. H. Henley.....	Alabama.
P. D. Cooper.....	Tennessee.	N. A. Neeley.....	Tennessee.
A. C. Drake.....	Kentucky.	J. A. Parrish.....	Georgia.
A. A. Dyer.....	Texas.	Albert Robinson (honorary)	Michigan.
Geo. A. Foster.....	Kentucky.	P. H. Wright.....	Mississippi.

### INDIANA DENTAL COLLEGE.

THE eighth annual commencement of the Indiana Dental College was held in the lecture-room of the college, in Ætna Block, Indianapolis, March 2, 1887, at 8 o'clock P. M.

The address on behalf of the trustees was delivered by M. Wells, D.D.S., and the address on behalf of the faculty by J. H. Oliver, M.D.

The number of matriculates for the session was thirty.

The degree of D.D.S. was conferred on the following graduates by W. L. Heiskell, D.D.S., president of the board of trustees:

NAME.	STATE OR COUNTRY.	NAME.	STATE OR COUNTRY.
Jas. W. Bates.....	Michigan.	Jno. H. Evans.....	Indiana.
L. G. Bell.....	Germany.	T. J. Hood.....	Kentucky.
John H. Bird.....	Michigan.	Milton Lamb.....	Indiana.
S. N. Blackledge.....	Indiana.	J. J. Lickly.....	Michigan.
Jno. E. Carmon.....	Illinois.	Geo. Marbach.....	Germany.
P. W. Earhart.....	Indiana.	S. Oliver.....	Pennsylvania.
W. N. Easton.....	Michigan.	Charles Woelz.....	Indiana.

### UNIVERSITY OF IOWA—DENTAL DEPARTMENT.

THE fifth annual commencement of the Dental Department of the State University of Iowa was held in the Opera House, Iowa City, Iowa, on Monday evening, February 28, 1887. The annual address



was delivered by Hon. W. W. Dodge, and the valedictory address by Jessie Ritchey, D.D.S. The number of matriculates for the session was fifty-seven.

The degree of D.D.S. was conferred on the following graduates by J. L. Packard, LL.D., president of the university:

NAME.	STATE.	NAME.	STATE.
C. W. Aydelotte.....	Indiana.	J. A. Neill.....	Iowa.
H. N. Edwards.....	Iowa.	Jessie Ritchey.....	Iowa.
L. S. Field.....	Iowa.	F. M. Shriver.....	Iowa.
E. T. Giddings.....	Iowa.	H. W. Shriver.....	Iowa.
E. S. Glasier.....	Iowa.	J. W. Soule.....	Iowa.
T. J. Glenn.....	Wisconsin.	Joseph Scott.....	Iowa.
C. H. Hare.....	Iowa.	W. R. Tipton.....	Iowa.
F. A. Hefner.....	Iowa.	H. M. Vawter.....	Iowa.
J. H. Johnson.....	Iowa.	J. B. Vernon.....	Iowa.
J. J. Little.....	Iowa.	D. P. Wetzel.....	Iowa.
W. A. Maxwell.....	Iowa.	Alfred Wood, A.M.....	Iowa.
R. McNutt.....	Iowa.	Geo. B. Yergey.....	Iowa.

### MEHARRY MEDICAL COLLEGE—SCHOOL OF DENTISTRY.

THE eleventh commencement of the Meharry Medical Department and School of Dentistry (first commencement) of the Central Tennessee College was held at the Masonic Theatre, Nashville, Tenn., on Monday, February 21, 1887.

The valedictory was delivered by John Wesley Pickett, M.D., and the address to the dental graduating class by W. H. Morgan, M.D., D.D.S., dean of the Dental Department of Vanderbilt University.

The degree of D.D.S. was conferred on the following graduates in dentistry by Rev. J. Braden, D.D., president of the college:

NAME.	STATE.	NAME.	STATE.
John W. Anderson, M.D.....	Kansas.	Robert F. Boyd, M.D.....	Tennessee.
Henry T. Noel, M.D.....	Tennessee.		

### HOWARD UNIVERSITY DENTAL COLLEGE.

THE annual commencement of the Dental College of Howard University was held, in connection with that of the Medical Department, at the Congregational Church, Washington, D. C., on March 9, 1887, at 7.30 P. M.

The general address to the graduates was delivered by Prof. Thomas B. Hood, M.D., and the valedictory address on behalf of the class in dentistry by Murdoch C. Smith, D.D.S.

The degree of D.D.S. was conferred on the following graduates of the dental class by W. W. Patton, D.D., LL.D., president of the university:

NAME.	STATE OR COUNTRY.	NAME.	STATE OR COUNTRY.
Charles V. Barrington.....	Illinois.	T. Ellsworth Lee.....	New York.
B. F. Darling, M.D.....	Iowa.	Franz M. A. Reinhard....	Germany.
Jefferson H. Johnston.....	Ohio.	Murdoch C. Smith.....	Massachusetts.

**MINNESOTA HOSPITAL COLLEGE—DENTAL DEPARTMENT.**

THE fifth annual commencement of the Dental Department of the Minnesota Hospital College was held, in connection with the Medical Department, in the Hennepin-avenue M. E. Church, Minneapolis, Minn., on Friday evening, March 11, 1887.

The address to the graduates was delivered by Prof. John E. Bradley, and the valedictory by James E. Cummings, D.D.S.

The number of matriculates for the session was nineteen.

The degree of D.D.S. was conferred on the following graduates by C. H. Hunter, A.M., M.D., president of the faculty:

NAME.	STATE.	NAME.	STATE.
James E. Cummings.....	New York.	Thomas S. Rounce.....	Wisconsin.
H. Ben Ober.....	Connecticut.	Clarence Strachauer.....	Minnesota.

**UNIVERSITY OF TENNESSEE—DENTAL DEPARTMENT.**

THE ninth annual commencement of the Dental Department of the University of Tennessee was held at the Masonic Theatre, Nashville, Tenn., on Tuesday evening, February 22, 1887.

The valedictory address was delivered by W. B. White, Jr., D.D.S.

The number of matriculates for the session was thirty-five.

The degree of D.D.S. was conferred on the following graduates by O. P. Temple, A.M., president of the university:

NAME.	STATE.	NAME.	STATE.
B. F. Atwood.....	Kentucky.	M. J. Masangill.....	Louisiana.
C. L. Averett.....	Georgia.	Logan J. McLean.....	Georgia.
James W. Bablow.....	Kentucky.	A. M. Platt.....	Michigan.
W. Fred. Brotherton.....	Wisconsin.	J. Q. Ramsay.....	Missouri.
Frank A. Brown.....	Indiana.	E. E. Rust.....	Wisconsin.
James K. Bryant.....	Kentucky.	H. P. Smith.....	Kansas.
F. M. Fewell.....	Indiana.	John E. Suber.....	Mississippi.
A. A. Francis.....	Ohio.	John E. Thomas.....	Indiana.
Marshall Grigg.....	Tennessee.	W. B. White.....	Kentucky.
E. J. Harris.....	Indiana.	H. M. Wilcox.....	Missouri.
W. W. Krape.....	Illinois.		

The honorary degree of D.D.S. was conferred on N. H. Wilson, of Indiana.

**KANSAS CITY DENTAL COLLEGE.**

THE annual commencement exercises of the Kansas City Dental College were held in Music Hall, Kansas City, Mo., on Tuesday evening, March 15, 1887.

The number of matriculates for the session was twenty-two.

The degree of D.D.S. was conferred on the following graduates:

NAME.	STATE.	NAME.	STATE.
G. W. Earl.....	Washington Ter.	W. A. McCarter.....	Indiana.
James M. Gross.....	Missouri.	S. S. Noble.....	Pennsylvania.
J. W. Heckler.....	Ohio.	J. H. Parsons.....	Indiana.
Robert Lawrence.....	Indiana.	Frank Strickland.....	Ohio.

The honorary degree of D.D.S. was conferred on Dr. H. W. Howe, of Lawrence, Kansas.

## ROYAL COLLEGE OF DENTAL SURGEONS OF ONTARIO.

At the Royal College of Dental Surgeons, Toronto, Ontario, for the session of 1886-7, the number of students in attendance was as follows: Primary 18; senior 20. Examinations being written, no thesis is required. No commencement exercises are held.

The following are the names of the successful candidates for the degree of Licentiate of Dental Surgery (L.D.S.):

NAME.	RESIDENCE.	NAME.	RESIDENCE.
A. H. Allen.....	Mt. Forest, Ont.	M. McKay, B.A.....	Pembroke, Ont.
D. Baird.....	Port Perry, Ont.	S. McPhee.....	Toronto, Ont.
H. L. Billings.....	Toronto, Ont.	W. A. Piper.....	London, Ont.
S. W. Coyne.....	Wardsville, Ont.	J. G. Roberts.....	Brampton, Ont.
J. J. Foster.....	Waterloo, Ont.	G. A. Swann, D.D.S.	Toronto, Ont.
J. L. Henry, D.D.S...	Oshawa, Ont.	A. Stackhouse.....	Pr. Albert, N. W. T.
A. A. Martin.....	Aylmer, Ont.	C. H. Zeigler.....	Parkhill, Ont.
W. H. McDonald....	Brussels, Ont.		

## EDITORIAL.

### NINTH INTERNATIONAL MEDICAL CONGRESS.

THE Ninth International Medical Congress will be held at Washington, D. C., commencing September 5, 1887. We give below the names of the president and secretary-general and a full list of those officially connected with the Dental Section, with the rules and regulations for the work of the Congress and the duties of officers, and also a circular letter and communication from the president and secretaries of the Dental Section:

*President.*—N. S. Davis, M.D., LL.D.

*Secretary-General.*—Jno. B. Hamilton, M.D., of U. S. A.

### SECTION XVII.

#### DENTAL AND ORAL SURGERY.

*President.*—Dr. J. Taft, Cincinnati, Ohio.

#### *Vice-Presidents.*

W. W. Allport, Chicago, Ill.	A. L. Northrop, New York, N. Y.
Frank Abbott, New York, N. Y.	A. O. Rawls, Lexington, Ky.
W. C. Barrett, Buffalo, N. Y.	Joseph Richardson, Terre Haute, Ind.
S. W. Dennis, San Francisco, Cal.	C. W. Spalding, St. Louis, Mo.
C. L. Ford, Ann Arbor, Mich.	L. D. Shepard, Boston, Mass.
W. H. Morgan, Nashville, Tenn.	James Truman, Philadelphia, Pa.
H. J. McKellops, St. Louis, Mo.	W. W. H. Thackston, Farmville, Va.
A. T. Metcalf, Kalamazoo, Mich.	V. E. Turner, Raleigh, N. C.



*Foreign Vice-Presidents.*

F. Busch, Berlin, Ger.  
 W. Herbst, Bremen, Ger.  
 L. N. Hollander, Halle, Ger.  
 Andrieu, Paris, France.

E. Magitot, Paris, France.  
 V. Haderup, Copenhagen, Den.  
 T. H. Harding, London, Eng.  
 W. Geo. Beers, Montreal, Canada.

*Secretaries.*

E. A. Bogue, 29 East Twentieth street,  
 New York City.  
 F. H. Rehwinkel, Chillicothe, Ohio.

E. Brasseur, 6 Rue Mogador, Paris,  
 France.  
 Elof Føerberg, Stockholm.

Julius Parreidt, Leipzig, Ger.

*Council.*

R. R. Andrews, Cambridge, Mass.  
 C. F. W. Bödecker, New York, N. Y.  
 C. A. Brackett, Newport, R. I.  
 B. H. Catching, Atlanta, Geo.  
 George H. Chance, Portland, Ore.  
 E. S. Chisholm, Tuscaloosa, Ala.  
 C. C. Chittenden, Madison, Wis.  
 D. M. Clapp, Boston, Mass.  
 W. R. Clifton, Waco, Texas.  
 J. S. Cassidy, Covington, Ky.  
 K. B. Davis, Springfield, Ill.  
 A. M. Dudley, Salem, Mass.  
 M. W. Foster, Baltimore, Md.  
 G. J. Friedrichs, New Orleans, La.  
 C. E. Francis, New York, N. Y.  
 Geo. L. Field, Detroit, Mich.  
 F. J. S. Gorgas, Baltimore, Md.

P. G. C. Hunt, Indianapolis, Ind.  
 A. O. Hunt, Iowa City, Iowa.  
 R. Finley Hunt, Washington, D. C.  
 George W. Keely, Oxford, Ohio.  
 Edw. C. Kirk, Philadelphia, Pa.  
 James Lewis, Burlington, Vt.  
 James McManus, Hartford, Conn.  
 W. N. Morrison, St. Louis, Mo.  
 J. Hall Moore, Richmond, Va.  
 T. T. Moore, Columbia, S. C.  
 Edgar Palmer, La Crosse, Wis.  
 H. J. Plomteaux, San Francisco, Cal.  
 S. B. Palmer, Syracuse, N. Y.  
 W. A. Spaulding, Minneapolis, Minn.  
 C. S. Stockton, Newark, N. J.  
 A. H. Thompson, Topeka, Kansas.  
 W. C. Wardlaw, Augusta, Geo.

J. W. White, Philadelphia, Pa.

*Finance Committee of this Section.*

J. W. White, treasurer, Chestnut street, cor. Twelfth, Philadelphia, Pa.  
 A. M. Dudley, secretary, Salem, Mass.  
 Edgar Palmer, La Crosse, Wis.  
 H. J. McKellops, 2630 Washington avenue, St. Louis, Mo.  
 L. D. Shepard, 100 Boylston street, Boston, Mass.  
 G. H. Winkler, Augusta, Ga.  
 W. W. Allport, 242 Wabash avenue, Chicago, Ill.  
 W. W. Walker, 67 West Ninth street, New York, N. Y.

*Reception Committee of this Section.*

A. L. Northrop, New York, N. Y.	D. McFarlan, Washington, D. C.
H. J. McKellops, St. Louis, Mo.	James McManus, Hartford, Conn.
A. M. Dudley, Salem, Mass.	W. W. H. Thackston, Farmville, Va.
William Carr, New York, N. Y.	E. A. Bogue, New York, N. Y.
L. D. Shepard, Boston, Mass.	F. H. Rehwinkel, Chillicothe, Ohio.
E. Maynard, Washington, D. C.	C. F. W. Bödecker, New York, N. Y.

*Committee on Operative Dentistry and Oral Surgery—Clinics.*

C. F. W. Bödecker, New York, N. Y.	Frank Abbott, New York, N. Y.
J. A. Watling, Ypsilanti, Mich.	W. C. Wardlaw, Augusta, Ga.
R. L. Cochran, Burlington, Iowa.	J. D. Patterson, Kansas City, Mo.

Others will be added to this committee as the work may require.

*Committee on Prosthetic Dentistry.*

Geo. L. Field, Detroit, Mich.

H. B. Noble, Washington, D. C.

A. O. Hunt, Iowa City, Iowa.

John Allen, New York, N. Y.

T. T. Moore, Columbia, S. C.

W. N. Morrison, St. Louis, Mo.

R. B. Donaldson, Washington, D. C.

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*Organization.*

The following Rules and Regulations have been adopted by the Executive Committee for the guidance of the work of the Congress and of its sections:

The Congress will consist of such members of the regular medical profession as shall have registered and taken out their tickets of admission, and of such other scientific men as the Executive Committee of the Congress shall deem it desirable to admit.

Books for registration of members will be ready on and after September 1, 1887, and on each subsequent day during the session. Any member desiring registration prior to this time may apply by letter to the secretary-general, and forward his dues with his full address, when a receipt will be returned.

The membership fee for residents of the United States will be ten dollars (\$10.00); there will be no dues for members from other countries. Each member will be entitled to receive a copy of the Transactions of the Congress when published by the Executive Committee.

The work of the various Sections will be directed by the president of the Section, and the order will be published in a daily programme for each Section.

Brief abstracts of papers to be read in the Sections shall be forwarded to the secretaries of the proper Section on or before April 30, 1887. These abstracts shall be treated as confidential communications. Papers relating to topics not included in the list of subjects proposed by the officers of the Sections may be accepted after April 30, 1887. The officers of each Section shall decide as to the acceptance of such proposed communications, and the time for their presentation.

The Executive Committee cordially invites members of the regular medical profession, and men eminent in the sciences collateral to medicine, in all countries, to participate in person or by papers in the work of this great humanitarian assembly.

The attendance of medical students and others interested in the work of the various Sections, or in the general addresses delivered in Congress, will be permitted on the recommendation of the secretary-general or the officers of a Section, on their taking out of the registration committee a general ticket of admission,—fee, one dollar. Such persons cannot take part in the proceedings.

All communications and questions relating to the special business of any Section must be addressed to the president or one of the secretaries of that Section.

*Officers of Sections and their Duties.*

The officers of each Section, including foreigners, shall be a president, not less than five vice-presidents, four secretaries (two foreign), and not less than ten nor more than thirty members of council.

*President.*—The president of each Section shall be its executive officer, who is solely responsible for the efficient work of his Section. He shall nominate all persons to the Executive Committee for any office connected with his Section. He shall select and regulate (by conference where desired with the other officers of his Section) all papers or questions for discussion, and reject only after such con-

ference such papers or questions as he may deem inadmissible to the Transactions or for presentation to his Section. He shall preside at and regulate the business of each meeting of his Section, punctually at the hour named, making an opening address to the Section if he so desires. He may at any time adjourn the session of the Section when in his opinion sufficiently long, as when there are too many papers for the day, etc. He shall strictly enforce Rule 8 of the preliminary organization. When a paper is read or discussion occurs in a foreign language, he shall resign the chair to a foreign officer of the same nationality as the language employed.

*Vice-Presidents.*—They shall assist the president in the performance of his duties at each meeting of the Section when requested by him, and shall take their seats on each side of the presiding officer. They shall aid the president in consultation on the value and character of all papers or discussions that are to be presented in the Section or the Transactions.

*Secretaries.*—The four secretaries of Sections shall arrange among themselves, or at the request of the president of the Section, the order of their duties. They shall keep accurate records of the proceedings of each day in their Section, and make such daily report of it to the Congress as the president of the Section shall direct; the foreign secretaries acting for their own nationalities. At the close of the session they shall present all their minutes in good order to the secretary-general for publication in the Transactions, if so desired by the Executive Committee.

*Members of Council.*—It is expected that the members of the Council will aid in every way to make the sessions efficient and instructive. They will also be expected to advise with the president on any matter pertaining to the work of the Section, and on questions which may arise in connection with the publication in the Transactions of papers read or discussion had in the Section.

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[Circular Letter.]

CHILLICOTHE, OHIO, January 1, 1887.

Believing that a concise statement of the present status of the Section of Dental and Oral Surgery of the Ninth International Medical Congress and its prospects of success, together with a short outline of what is expected to be accomplished, will be acceptable and interesting to all who are in accord with this professional movement, the following is respectfully submitted:

The organization of the Dental Section is now complete, with the exception of one or two committees, which will be filled and announced soon. Active work is now being pushed forward, and will not cease until the Congress is a thing of the past.

The Executive Committee of the Congress has, from the beginning, shown a most liberal spirit towards the Dental Section, and has constantly encouraged it in its work of organization. Questions have arisen in regard to qualifications for membership; the raising of funds for the work of the Section and their disbursement; the nature of its work, and methods of conducting it; all of which has been left entirely to the Section, only requiring the observance of and compliance with the general rules established for *all Sections alike*.

The outline of the work of the Dental Section as now arranged contemplates the reading and discussion of papers on scientific subjects connected with dental science; a series of clinics in the operative branch of dentistry, demonstrating the



different methods of filling teeth and the use of the various materials for this purpose.

In the department of prosthetic dentistry the various styles of crown and bridge-work will be demonstrated by skilled operators from the several countries represented; also, all the forms and styles of artificial teeth and plates in use, including continuous-gum work; the various styles of gold and other metallic plate work, including cast plates; any new or valuable improvement in the different plastic materials, such as celluloid and rubber, or their various combinations. The actual construction of all prosthetic work will be carried on by experts selected for this purpose.

The work will be distributed through a series of apartments, so arranged as to give ample opportunity for observation. Rooms will be provided with a number of instruments for microscopic examinations of specimens, and the details of such work will be shown. Other rooms will be provided for showing the results of original investigations upon practical subjects bearing upon dental science.

In short, the practical demonstration of all branches of dentistry will be made a prominent feature of this section.

The qualification for membership, by invitation to the Congress, is left to the decision of the officers of the Section. Invitations will in due time be issued, either by the secretary-general of the Congress, or be forwarded through the secretaries of the Section.

The attendance from abroad promises to be large. From England come most encouraging reports; also from France, Germany, and Scandinavia.

For further information, apply to either of the secretaries of Section.

J. TAFT, *President*, Cincinnati, O.

F. H. REHWINKEL, *Secretary*, Chillicothe, O.

TO THE EDITOR OF THE DENTAL COSMOS:

DEAR SIR: Will you allow me to request those of your readers who will assist in the Dental and Oral Section of the International Medical Congress to furnish me with an abstract of their papers or the papers themselves at once?

These papers must be in the hands of the secretaries as soon as possible, in order that a definite programme may be arranged and a proper amount of time apportioned for each subject.

E. A. BOGUE, *Secretary*,

29 East Twentieth street, New York, N. Y.

### THE COLLEGE COMMENCEMENTS.

THE reports of the annual college commencements—sixteen in all—in this issue of the DENTAL COSMOS afford by their number, as well as by the number of the graduates, a notable contrast to the reports of a decade since. The graduations this year exceed all precedent, and the publication of the lists may appear to some of our readers to require a greater amount of space than is desirable. We feel, however, that their collection in a single number is a matter of importance, and will prove a convenience to subscribers for years to come when seeking to determine when and where an individual obtained his degree. The reports are complete so far as the commence-

ments had been held at the time of going to press. That no subscriber may complain, however, we have added extra pages in order to admit the reports, but have been obliged to lay over bibliographical and other matter.

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## OBITUARY.

### DR. JOHN G. WAYT.

DIED, in the City of Richmond, Va., on the morning of February 17, 1887, DR. JOHN G. WAYT, in the seventy-seventh year of his age.

Thus has passed away—thus has been gathered by the “grim Reaper” in his ghastly harvest—one of the leading and representative members of our profession, who was no less distinguished by his skill and success as an operator than by his fidelity and devotion to the welfare and advancement of the department of science to which he gave the days and years of his long and busy life.

Dr. Wayt was born at Charlottesville, but established himself in dentistry at Richmond nearly half a century ago, where he soon had an extensive and lucrative practice. No less distinguished and esteemed was Dr. Wayt in the domain of his chosen calling than in the social sphere, which he adorned by his personal graces and ennobled by the elevation and purity of his individual character.

It is no extravagance of language to say that the loss of such a man as Dr. Wayt must be regarded not only as a domestic and social bereavement, but as a public and professional calamity. No dentist of Virginia, perhaps of the South, had a larger “clientele,” or held a stronger grasp upon their confidence and affection. Polished, manly, and courteous in his bearing; brave and just and chivalrous in all his intercourse, he not only commanded the respect and esteem of society for himself, but reflected upon his loved profession a dignity and consideration equaled or approached by few of his contemporaries, but eminently worthy the emulation of all in our ranks who survive him.

While Dr. Wayt's abilities were acknowledged, and his resources were most ample, his innate and characteristic modesty prevented his shining as conspicuously as he should have done, either as a speaker or as contributor to the literature of his profession; nevertheless, he was a diligent student, a hard and faithful worker, and the staunchest of all advocates for the progress, development, and elevation of “American dentistry,” as well as the kindest, most generously hospitable and encouraging of friends to the members of his craft,—especially the young, the ambitious, and the aspiring.

But alas! alas! our old and honored friend is now no more. Another of our grand and symmetrical columns has crumbled and

fallen. Another of our strong, bold headlands has disappeared,—has faded from mortal vision.

Peace to the ashes of our lamented friend, undying honor to his memory, and everlasting homage to the *character* he illustrated in life, and to the *example* he bequeathed us in his death.

W. W. H. T.

At a full meeting of the dental profession of Richmond, held February 17, 1887, a preamble and resolutions were adopted expressing profound sorrow at the death of Dr. Wayt, who was "universally held in honor and respect by the citizens of the community in which he had so long resided, . . . who had done so much to advance the interests of dentistry, . . . who always found time to lend a helping hand and give a cheering word to the younger members of the profession, . . . and who never failed to take an active part in whatever served to promote public interest or Christian benevolence." It was resolved that in his death "Richmond has lost one of her most valued and public-spirited citizens, and the dentists their most illustrious exemplar and respected and beloved colaborer;" that sincere sympathy be tendered to the bereaved family, commending them to Him whose ways are past finding out, "but who is too wise to err, and too good to be unkind."

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### THOMAS ASHTON, D.D.S.

DIED, in New York, January 31, 1887, of pneumonia, Dr. THOMAS ASHTON, in the forty-first year of his age.

Dr. Ashton was graduated from the Pennsylvania College of Dental Surgery, in the class of 1884; locating immediately thereafter in Philadelphia. His health failing, he removed to Urbana, Ohio, intending to practice at that place.

The members of his class at college, to whom he was endeared by his gentle, genial manner and sterling qualities, will hear of his death with deep regret. He leaves a wife and daughter.

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### JAMES M. EASTON, D.D.S.

DIED, at Pittsburg, Pa., February 21, 1887, JAMES M. EASTON, D.D.S., in the twenty-sixth year of his age.

Dr. Easton was a graduate of the Pennsylvania College of Dental Surgery, class of 1885. His illness was of brief duration. Although he had been in practice but a short time, he exhibited talent of a high order, and gave promise of a successful future. His amiable character had secured him a large circle of friends, who bear testimony to his sterling qualities, and sincerely mourn his early decease.



THE  
DENTAL COSMOS.

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VOL. XXIX.

PHILADELPHIA, MAY, 1887.

No. 5.

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ORIGINAL COMMUNICATIONS.

ON SOME OF THE PATHOLOGICAL CONDITIONS FOUND IN  
DENTINE AND IVORY.

BY W. XAVIER SUDDUTH, M.D., D.D.S.

(Read before the First District Dental Society of the State of New York, Tuesday Evening, February 1, 1887.)

THE term "organic" is no longer used in a strictly chemical sense. Compounds which had hitherto been considered capable of production only by the action of the life-process may now be produced in the laboratory. All tissues of the body are organic in that they are produced by organs, yet not all tissues have the power of performing the functions of organs. It then becomes essential in making a classification that we take into consideration, in addition to functions, physical characteristics as well.

Tissues are either active or quiescent. They take part in the bodily functions or they do not, as the case may be. They are subject to inflammatory action and have the power of reaction under stimulus, or they remain perfectly passive, subject only to disintegration. Between these two well-defined classes comes a third, which has the power of recuperation and inflammatory action, but not the power of performing function. In this class may be placed the tissues of the muscular system and all other tissues of like character; also the osseous system. Tissues which have not the power of performing vital function, which do not have recuperative ability, and are not subject to inflammatory changes, but remain perfectly passive, such as enamel and dentine, may very properly be termed *fixed tissues*. They are the product of the life-process, and are organic in the sense that all tissues of the body are organic; nevertheless, they differ materially from the other tissues of the body. They are composed of fixed material and remain throughout the life of the individual as they were left by the hand of the life-process, or else they pass through a condition of retrograde metamorphosis from which they have not the power to recuperate. That

this process is self-limiting in some instances all will admit, but that a very considerable amount of *outside interference* is necessary is certified by our every-day practice. You may talk as much as you please, gentlemen, regarding the constitutional treatment of diseased conditions occurring in tooth-substance,—in other words, *decay*. I have passed through all that. The best prescription for such conditions, either preventive or otherwise, according to my judgment, will read about as follows:

R.— $\frac{1}{2}$ -doz. S. S. White stoned engine burs. Filling material best suited to the individual needs of the case; quantum suff. to make a good plug.

Sig.—To be applied locally as soon as disease presents itself, and as many times thereafter as necessary.

He is the best doctor who can most skillfully apply the remedy. Of course I have reference to lesions in *tooth-structure*, and not to those which occur in the surrounding tissues, and for the skillful treatment of which the dental surgeon cannot know too much of all that pertains to general medicine and special pathology. Neither can he be too well posted regarding the minute anatomy of the organs upon which he is daily called to operate. To the furtherance of the latter phase of dental literature I make this small contribution. Several years ago, when I came up for examination before the professor of prosthetic dentistry in the Philadelphia Dental College, I was asked among others this question: "Why do you fill a cavity of decay?" I made answer, "Because it cannot fill itself." A somewhat impertinent answer, I must admit, but pertinent surely to the question, as also to the one in hand, which is my excuse for relating the circumstance.

In this answer lies the differential diagnosis between a carious process in bone and decay in a tooth, and it also points to the classification of the tissues themselves.

It is often remarked that if there is the least trace of "organic matter" in enamel it must be nourished. This is an entirely false idea regarding organic material, for organic material is not necessarily living matter, although the reverse is always the case. Protoplasm or cell-pabulum is essentially organic, yet protoplasm is not living matter until it comes into contact with the vital principle. Non-vitalized protoplasm may be encapsuled in the substance of enamel and remain unchanged for an indefinite length of time. I say that if there *is* the slightest trace of living matter in enamel then it must be nourished, but I do not think that any one will ever be able to demonstrate its presence, except it be in a pathological specimen. I am very free to admit that varying quantities of fixed material can be demonstrated in some specimens of enamel, but that any vital or living matter enters into enamel as an essential element

I most strenuously deny. Living matter is a necessity to an inflammatory process, and until it can be shown that there is a source of nutrition for enamel no advance can be made in the inflammatory theory. Fixed material is also found in nails, horns, and hoofs. I can conceive of an inflammation occurring more easily in these tissues than in enamel or dentine, yet no one has attempted to prove such a theory.

Dentine, however, is a living tissue; the living matter therein is directly connected with the pulp; but no vascular system has ever been demonstrated in the dentine. The fibrils are nourished as a part of the odontoblasts, which come in contact with a rich vascular supply. That the dentinal fibrils take on an inflammatory action no one doubts who has prepared cavities containing such hypersensitive fibrils. The reaction, however, is produced in the odontoblasts. Secondary dentine is the result of irritation of the dentinal fibrils. No evidence has ever been adduced which substantiates the claim to a reaction in the substance of the dentine. That we do not understand all the phenomena to be observed in dentine, I am free to admit. The translucent zone has long been an unsolved problem. Many have claimed that it represented a consolidated territory, containing more lime-salts than normal dentine, and hence was proof of a reaction upon the part of the dentinal fibrils. Others held that it was the forerunner of decay, and that decalcification had taken place in the affected territory. I think that I have been able to demonstrate that the tubuli in this zone are permeable to the essential oils, which would indicate that there has been no consolidation. Dr. G. V. Black holds that the tubuli in the infected regions are filled with the débris of the dead and disintegrating fibrils, and that he has cleared them up by placing the sections in ether, which dissolved out the fat. Dr. W. D. Miller writes: "All I can say regarding the transparent zones is that they occur preëminently in living teeth, and that the percentage of lime-salts in these zones has undergone little or no perceptible change. My analysis gave for the zones 71.9 per cent., and for normal dentine in the same teeth 72.0 per cent."

Regarding the consolidation under fillings, it is well known that such consolidation occurs to the greatest extent under those fillings which are the least irritating to tooth-substance. If this condition represented an inflammatory reaction, the converse would be the result. I do not understand how it can be said that a new deposit of dentine can occur around fillings. That there is consolidation all will agree, but that there is deposited in the surrounding tissue additional lime-salts, is open to grave doubts. There have been no chemical experiments to ascertain the accuracy of the statement, and



unless based upon such evidence it must pass for a mere assertion. I think we can safely say that no positive evidence has been produced to prove that there ever is any recalcification or consolidation by deposition of the salts of calcium in the substance of the dentine.

Dentine and enamel come under the class which I have denominated fixed tissues. Where pathological lesions occur in these tissues, they must of necessity find their explanation in either a faulty development, traumatic injury, or in a disintegrating agent which lies without and beyond the control of the tissues under consideration.

Having stated that perverted physiological action in development is one of the sources upon which some of the pathological conditions found in enamel and dentine depend, it devolves upon me to show to what extent this is so. Such a discussion necessarily includes the whole ground of development. I shall, however, present the subject in a general way, dealing rather with the principles which underlie the formation of tissues than with the minute details of the process.

The term "development" signifies progress, construction, the act of building and being built.

The imprint of the governing circumstances is always made in the developing tissue. Within certain limits the variation may be said to be normal. Any great divergence, however, is pathological. Let us then consider the necessary elements for the proper formation of dental tissue.

In the development of teeth the character of the resultant tissue depends upon three things:

I. The nature of the cells.

II. The kind and quality of formative material.

III. The matricial substance.

It is a perfectly logical inference to draw that healthy, vigorous cells will produce a perfectly normal tissue, and that a pathological tissue will result from cells the regular working of whose functions are in any way interfered with. Let us for a moment consider cells in their normal condition, so that we may better understand the conditions which are unfavorable to the development of normal tissues. A cell is a mass of protoplasm inclosing in its central part an oval body termed a nucleus. Surrounding this mass of protoplasm may or may not be a cell-wall. The "infant cell" is, however, always destitute of such a limiting membrane; the protoplasm of one cell uniting with that of its fellow, so that we may describe the tissues of a very young embryo as made up of an innumerable number of nuclei which lie embedded in a mass of protoplasm. The nuclei stain quite darkly with hæmatoxylon, while the surrounding protoplasm remains unstained, or stains but slightly. In the central por-

tion of the nucleus there may be discerned small oval bodies known as nucleoli. These stain more darkly than does the nucleus. These are said to be the youngest vital tissue in the cell. Certain it is that in cell-multiplication the first indication of cell-division is noticed in the rearrangement of these small granular particles. Subsequently they arrange themselves into separate bundles; then the nucleus is divided into two or more portions, according to the number of bundles which have been formed by the nucleoli. Division of the surrounding protoplasm follows after the same manner. The essential element in the animal cell is the nucleus. In embryonic life this is always bathed by protoplasm in different degrees of fluidity. This semi-viscid, intercellular fluid plays a mechanical part in the deposition of the lime-salts. Any mucilaginous substance would probably answer the purposes of nature just as well. This has been fully demonstrated in numerous experiments.

I do not want to be understood as saying that bone, dentine, and enamel have been produced artificially, but that, after decalcification, there remains a substance which so closely resembles matricial substance that scientists have no hesitancy in pronouncing them one and the same. I refer to the production of calco-globulin by the deposition of the salts of calcium in albumen or mucilage. The formation of renal calculi is also an example of a similar nature where calcification occurs without the aid of the *vital principle*. From these observations, we come to the following conclusions regarding the essential conditions necessary for the normal calcification of living tissues:

- I. The presence of secreting agents.
- II. A substance to be secreted.
- III. A matrice or menstruum into which the secretion may be deposited, and with which it may enter into chemical combination.

The absence of any one of the above conditions will obviate the formation of calcified tissues. The secreted substance must also be in the right quantity. Variations in the proportion of menstruum to secretion may exist with certain bounds, but such variation is noticeable in the tissue produced. Any great deviation results in a pathological condition.

The secreting agents in tissues are the nuclear bodies which lie imbedded in the protoplasmic basis-substance. As we have previously remarked, they make up the substance of the tissue, and up to a certain period no difference can be detected between those which will eventually be selected to perform special work and those which will for the time, at least, remain quiescent. At certain points, however, in the mass of tissue cellular activity may be noticed. The cells, obeying the influence of cellular stimulation, are undergoing a change

which will result in the formation of a class of cells with special function.

Following the regular course of nature, they develop into certain well-known forms. At the time secretion begins the cell is at its fullest stage of development, both as regards size and functional activity. Bone cells, which are the modified osteoblasts, are considerably smaller than the latter. Odontoblasts, also, when secreting the dentine, are larger than the permanent cells that are found in sections of mature pulp. This increase of size is also to be remarked in the cells of secreting glands when in a state of functional activity. This condition of cells may be demonstrated by means of staining agents. At such times they stain more deeply than when quiescent.

Cells have a natural selection of material with which to build the several tissues. Nature when left to herself makes no failures. It is remarkable that so few pathological conditions are to be found, when we consider the many obstacles placed in the way of the performance of her natural functions.

The secretion and deposition of lime-salts into the protoplasmic basis-substance in the different processes of calcification result in tissues varying in hardness. This variation is due to several things: the amount of living organic matter contained in the tissue, the proportion of fixed material to the inorganic constituents, and the kind and arrangement of the inorganic constituents.

In bone, in addition to the fixed material expressed in the calco-globulin found in the matrix after decalcification, there must also be considered the vascular supply,—the bone-cells and their fibrils. The cortical portion of bones contains less organic tissue, and is consequently harder. Certain forms of exostosis, especially those occurring in the orbital cavity, are almost as hard as enamel. Dentine contains less organic tissue and is much harder than bone; and enamel, containing almost none, is the hardest of all the life products.

In the development of dentine the salts of calcium are secreted by the odontoblasts and deposited into the meshes of the dentinal fibrils. The right proportion of the salts of calcium to matricial substance being maintained, the development of the dentine will result in normal tissue. If, on the other hand, the supply of calcium salts falls short, through any cause, then the tissue will not be fully calcified, and larger or smaller partially calcified territories will occur, which have been denominated interglobular spaces. It is held by some that a certain quantity of lime must be secreted to produce calco-globulin, or else the continuity of the matrix would be lost in decalcification. I can conceive, however, of the encapsulation of a certain quantity of protoplasm which shall remain as such throughout the life of the tooth, provided it is thoroughly encapsuled. In



some instances these uncalcified territories approach the surface, and by actual contact or by a carious process become exposed to the action of the various fungi found in the mouth. They form the very best location for the development of micro-organisms, which penetrate from one to another until whole territories of tooth-substance are undermined. The calco-globulin is dissolved by the solvent ferment developed by the micro-organisms, and cavities are left. I have seen a number of such cavities, and have demonstrated by the staining process, as well as by cultures, the presence of micro-organisms. Their presence positively demonstrates the fact that such cavities have connection with the surface, for micro-organisms have never been known to penetrate sound dentine. Decalcification always precedes their ingress.

Enamel is secreted by the ameloblasts and deposited upon the external surface of the dentinal cap. The amount of protoplasm, however, is limited in quantity. That a certain portion exists is proven by the fact that, when we decalcify developing teeth, up to a certain age there remains a matrix which represents the thickness of the enamel at that time. It must be remembered that this is microscopic in its width, and forms the point of inter-digitation between the dentinal fibrils and enamel-prisms. When we decalcify older teeth the enamel is all removed, and no matrix is left behind, as in bone or dentinal decalcification, thus demonstrating that the proportion of matricial substance is very limited in enamel. I want to impress the fact that I consider this matricial substance, whether found in bone, dentine, or enamel, fixed material and not living matter. A certain proportion of such material may be demonstrated in enamel in varying quantities. There also occur territories which are analogous to the interglobular spaces; yet I never have been able to demonstrate nuclei by any process of handling. As I have several times pointed out, there is no appearance of a reticular structure to be found in enamel.

The matricial substance may be demonstrated in some cases, but not in all. The quantity is not always sufficient to be noticeable. For such studies, make ground sections of the softer varieties of enamel of freshly-extracted teeth stained with carmine. Carmine is preferable because it better resists the decolorizing action of the acid which is next used to decalcify the section. After staining, a dilute solution of acetic acid is allowed to flow over the section, which must be placed on a slide and covered with a cover-glass to protect the objective.

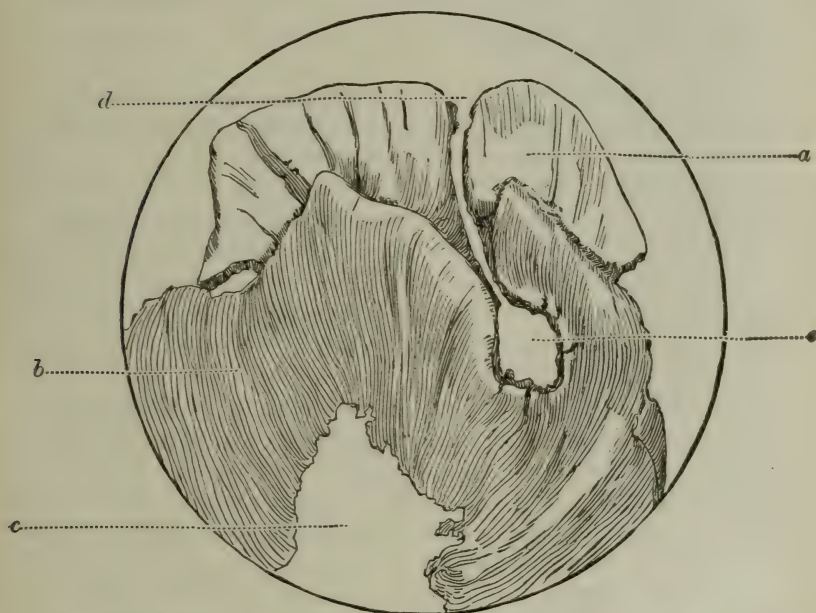
As decalcification occurs a slight cloud is noticed along the edge of the section. This is composed of the accumulating matricial substance which, as the lime-salts are removed, settles down on the slide.

When the section is very thin there is hardly any perceptible accumulation; in the thicker sections it shows better. It requires a high-power objective to demonstrate it. The greatest care must be observed not to produce currents, or to jar the specimen, because the least motion will cause the layer to break up and lose itself in the surrounding fluid. This fact is also a demonstration of its non-reticular character; were it reticulated, it would hold together with more tenacity. I have tried to examine this matricial substance in sections ground across the prism, hoping to locate its position, whether inter- or intra-prismatic, but have never been able to demonstrate it in such sections.

It is possible that the specimens examined contained such a small per cent. of fixed material that it could not be demonstrated. The matricial substance is so finely divided that when it breaks up no traces of it can be seen. In no instance could a reticulum or nucleated structure be demonstrated. When globular territories are located near the surface of the enamel, they are easily exposed by slight loss of tooth-substance through abrasion or decay. This point of exposure may be so slight as to elude the eye or the instrument, and yet be sufficient to admit the ingress of micro-organisms. A common place for the location of such encapsuled masses of protoplasm or calco-globulin is immediately beneath the sulci. The cusps of the teeth are formed by an infolding of the enamel-organ, and a larger or smaller quantity of protoplasm is very apt to become encapsuled. A perfect union of the several cusps in the sulci of the tooth is seldom seen. This leaves a canal which in many instances ends in a partially or entirely uncalcified territory of protoplasm. Micro-organisms penetrate into this mass of tissue, and, by means of the solvent ferment which they produce, the contained tissue is dissolved out and a cavity remains. Clinically we are all familiar with such conditions. The cavity thus formed is flask- or pear-shaped, having frequently a narrow neck with so small an opening that it will not allow the passage of the finest broach. The cavity, however, may attain considerable size. When preparing sections by grinding, it is very easy to overlook the outlet of such a cavity and grind it away with a few turns of the wheel. This is especially true of those formed by an infolding of a sulcus in the crown. The accompanying illustration was made from just such a pathological tooth. When grinding the tooth for another purpose, I accidentally noticed a small oval cavity. I say *accidentally* because there are no external appearances on a tooth which will in the least indicate the existence of such pathological conditions. I was working at the time in Dr. Miller's laboratory in Berlin. I handed the specimen to Dr. Miller, who examined it and returned it with the remark that it

very much resembled a cavity in the solid dentine. We immediately made cultures from it to see if it contained micro-organisms. Then I turned the specimen over and proceeded to grind very carefully from the other side. I was certain that with care I would be able to preserve the outlet. There was no immediately overlying sulcus. The cavity, as will be seen by examining Fig. 1, which shows the pulp-cavity with the sulcus, is situated over the apex of the pulp. Proceeding with the grinding, I was at last rewarded by the appearance of a canal which led to the surface. The microscopic examination of the surface of the enamel immediately overlying the cavity revealed nothing more than a slight depression filled with

FIG. 1.



*a*, Enamel; *b*, Dentine; *c*, Pulp Cavity; *d*, Opening into Canal; *e*, Pocket at end of Canal.

discolored enamel, which was apparently only a point of incipient decay, too small to admit the passage of a fine instrument for any depth. The canal found its outlet at this point. (The photographic enlargement, together with the springing apart of the sides of the specimen in mounting, gives the canal the appearance of considerable width; such, however, it did not have.)

The sides of the canal were apparently in contact, the excrescences of one side fitting into depressions of the other side. Microscopic examination of the specimen, when ready, revealed the fact that the cavity was lined for a considerable distance from its mouth with



enamel. The soft mass, which was removed in the grinding process, was evidently calco-globulin. The culture tests made from this soft mass demonstrated the presence of micro-organisms. The tooth in question was one among several which Dr. Miller had procured for me fresh from the clinic; consequently it had not been allowed to dry. The finding of this particular cavity was very opportune, and had my thoughts not been directed to such lesions, I would in all probability have carelessly ground out the canal without noticing it, as others have no doubt done.

The first appearance of the cavity was entirely deceptive. The bridge of dentine which covered the canal gave the appearance of a complete surrounding layer of dentine, and had I turned the specimen over and ground the section down as thin as possible from the other side, I would have had a cavity which was entirely surrounded by dentine.

This question may, happily, be illustrated in macroscopic specimens which all may see and examine. We will therefore dismiss its consideration in human teeth, and take it up in connection with cavities found in ivory. I have the pleasure to present for your examination eight pieces of pathological ivory. These specimens were selected by myself from several thousand pieces examined, both at home and abroad, and represent the varying pathological conditions to be found in ivory, except the actual presence of a ball or spear-head, though Fig. 7 shows the presumable point of entrance of one of these instruments.

In the consideration of the subject of pathological ivory, it is essential that we understand something of the condition of normal ivory and the manner of its development.

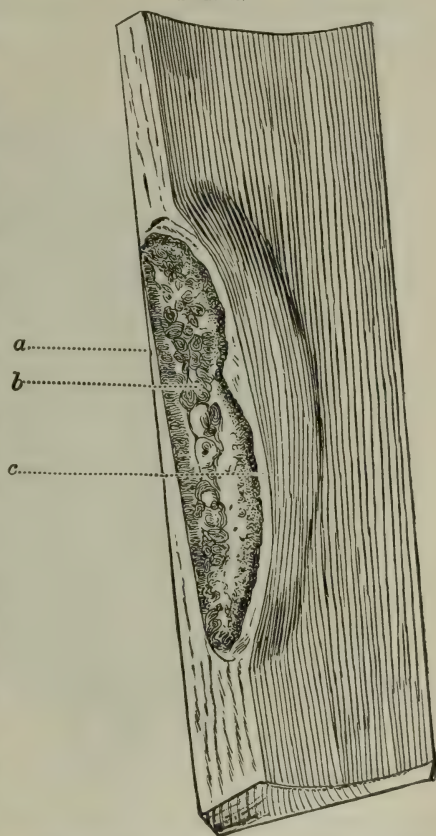
Tusks, as a rule, belong to the class of continuous-growing teeth. As they increase in length they are consolidated internally by depositions from the pulp, until finally the pulp-canal is itself obliterated for a considerable distance from the apex. The final deposition is generally very imperfect, and the nerve-canal may always be traced by the pathological appearance of the last deposited layer. I have a good example in a specimen cut from the central portion of an otherwise healthy tusk, and showing a longitudinal section of the obliterated pulp-cavity. The process of consolidation proceeds centripetally,—from circumference to center. It does not, however, proceed continuously, but at interrupted stages. This mode of development produces layers like the rings formed in the bodies of trees. Were the development continuous, the whole body of the tusk would appear as a solid piece; but such is not the case, for in cross-sections of tusks the markings are plainly shown. In mammoth tusks, which are found in large quantities in Northern Russia,

and which are used quite extensively in the manufacture of fancy articles, this point is well shown, for in many instances the layers have become separated by long exposure to the action of the elements, and can be taken apart like a nest of cones. This point has a very considerable bearing upon the question in hand. I have found that cavities which appear in ivory are either situated between these layers without the perceptible loss of any tissue, or else they show upon their face so plainly the fact of pathological development that no other inference can be drawn. Then, again, where masses of pathological ivory are found in the substance of the ivory there is always a bulging of the inner layer, by which it encroaches upon the pulp-cavity; thus showing that the inclosed mass once represented a point or mass of secondary ivory, pathological in character, which became inclosed when the general stimulus to the deposition of another layer was given. (See Fig. 2.)

It will also be seen that, beside the markings which locate the cavities between the layers, another point may be considered to prove that there is no loss of tissue. This is found in the fact that in measuring the width of the walls of the cavity very little appreciable difference between their sum and the sum of the width of the healthy layers at the sides of the cavity is discovered. When there is an inclosed cavity there is also an internal bulging like that seen in an inclosed mass of secondary or pathological ivory.

Specimen No. 3 (see Fig. 3) is a very typical example of a vast majority of the cavities found in ivory, and is more than an average in magnitude. The cavity measures  $2\frac{1}{2}$  by  $7\frac{1}{2}$  and  $10\frac{1}{2}$  centimeters. It is perfectly circumscribed except at its upper extremity,

FIG. 2.

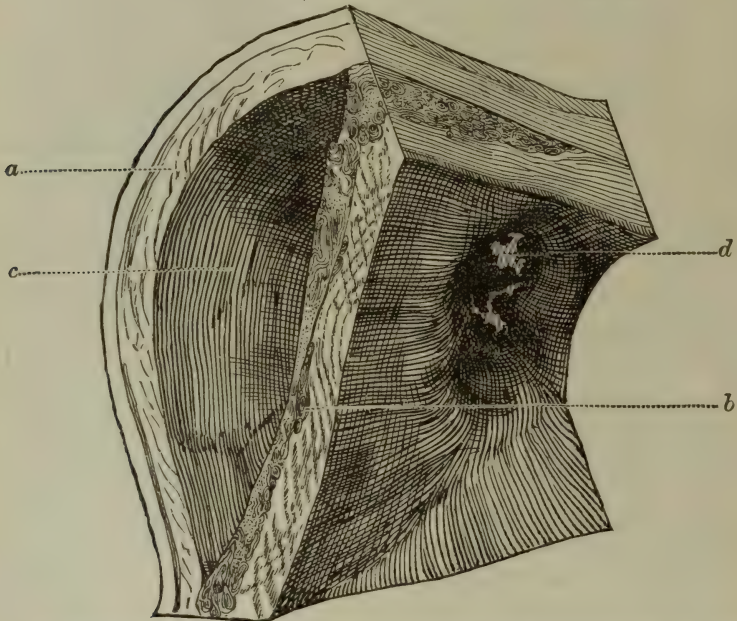


a, Outer Layer of Ivory; b, Secondary Ivory; c, Inner Layer of Ivory.

where it is connected with the pulp-cavity by an irregular orifice. The fact that this connection lies at the upper portion of the abscess cavity may have had something to do with the springing off of the plate in development. Development of the inner plates, as we have seen, occurs from apex towards the base of the tusk. The forming pus, not having a free basal outlet, would tend to accumulate, and thus force the developing inner plate away from the outer one.

That this and all such cavities have at some stage of their existence contained pus, I have no reason to doubt. They represent a diseased condition of the formative organ at the time of inception,

FIG. 3.



*a*, Outer Layer of Ivory; *b*, Inner Layer of Ivory; *c*, Pus Cavity; *d*, Opening into Pulp Cavity.

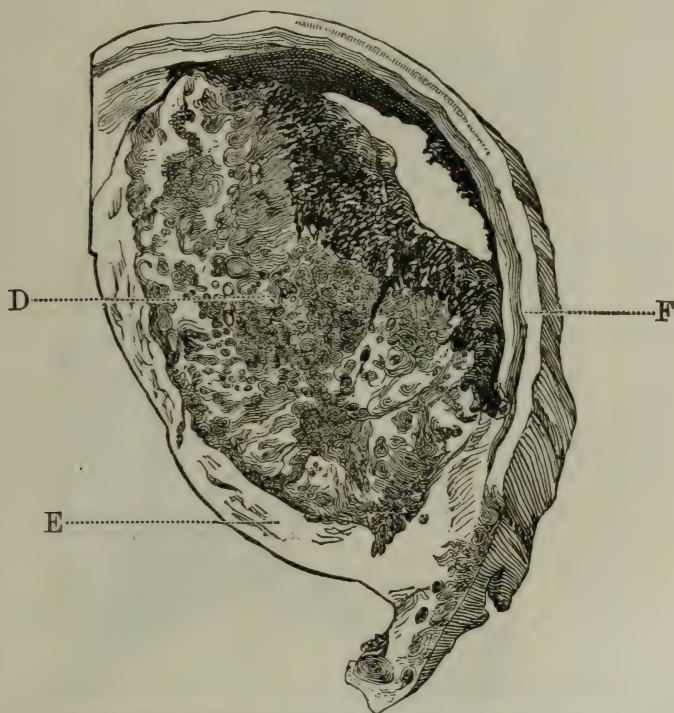
and pus is the constant accompaniment of diseased conditions. The smooth inner walls of this particular cavity, however, indicate that it never contained any cellular tissues. When a more healthy condition had been established in the surrounding tissue, nature made an ineffectual effort to close the orifice by the deposition of an irregular mass of hard tissue, and perhaps may have succeeded by the ingrowth of soft tissue; but this cannot be positively asserted; neither can we say what was the origin of the diseased condition in the first instance.

In Fig. 4 we have a very interesting specimen, showing an exter-



nal opening in the cavity, and also a decided pathological condition at the base of the tusk, as evidenced by the great amount of pathological ivory deposited. The cavity has also been partially filled with a large mass of secondary ivory, marked D in the specimen. The outlines of the cavity are plainly seen; the bulging of the inner plate also clearly indicates that the cavity antedated the secondary growth extending into it. Extensive cell-proliferation was set up from the surrounding connective-tissue, which from the presence of the plainly indicated diseased condition of the cortical layer

FIG. 4.



E, Inner Wall of Cavity; F, Outer Wall of Cavity; D, Secondary Ivory.

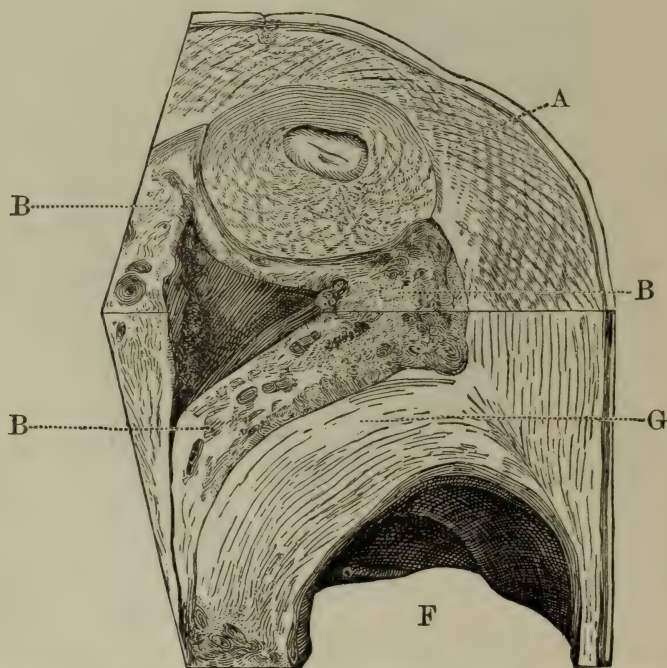
was made up of ivory-producing cells. This cavity in all probability arose from traumatism, by which a diseased condition was induced in what was then the base of the tusk, and the free border of the cavity as now seen represented the thickness of the tusk at its base when the accident occurred. The inner wall of the cavity E, was formed after the diseased condition was set up at the base of the tusk. The immediate connection of the mass of secondary ivory within the cavity and that at the base of the tusk leaves no doubt regarding its origin.

The inclosed mass in specimen 2 (see Fig. 2) also as plainly indicates, by the internally bulged plate, that it was formed previous to the inner plate.

In no single instance have I seen a specimen where secondary masses had been developed which did not have a similar explanation.

I have found but very few cavities which had no opening either into the pulp-cavity or one upon the surface. Fig. 5 presents a cavity which had no visible external or internal opening, but as I did not see the upper half of the specimen I cannot positively say

FIG. 5.



A, Plug of Ivory ; B, Secondary Ivory ; G, Curved Layer of Normal Ivory ; F, Pus Chamber.

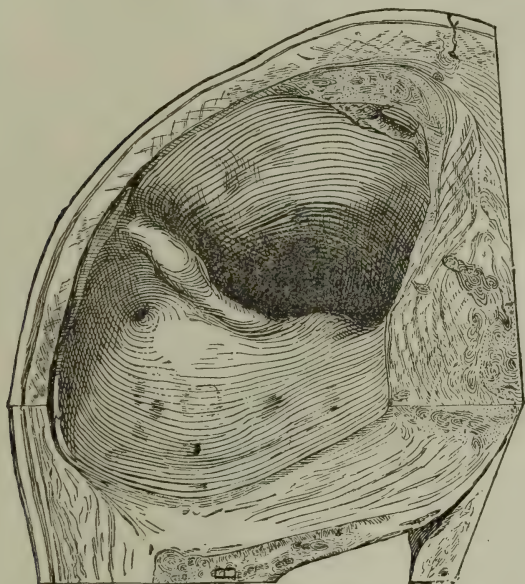
that there was no opening externally. I had this specimen sawed longitudinally through the center of the block so as to show the center of the nerve-canal. It will bear careful study. Since the obliteration of the pulp-canal is the latest change that can occur in the arrangement of the layers of ivory, the curved layer, G, must have been formed previous to the one marked B B B, which represents the last act of the pulp in forming secondary ivory. The upper portion of the pulp-cavity is obliterated by its deposition. If we were to remove this layer B, then the specimen would present ex-

actly the same appearance as seen in Figs. 3 and 4, so far as the bulging of the internal layer is concerned.

Turning the specimen over and examining the circular plug of ivory marked A, it will be seen to encroach upon the piece B, which also indicates that in development it preceded the formation of the latter layer. The cavity was evidently connected with the pulp at this point, and the development of the plug (A) shut the chamber off from the pulp.

Regarding the pathological layer of ivory which lines the cavity, it is similar to the mass found at D, Fig. 4. It must have been

FIG. 5a.



View looking into Pus Chamber.

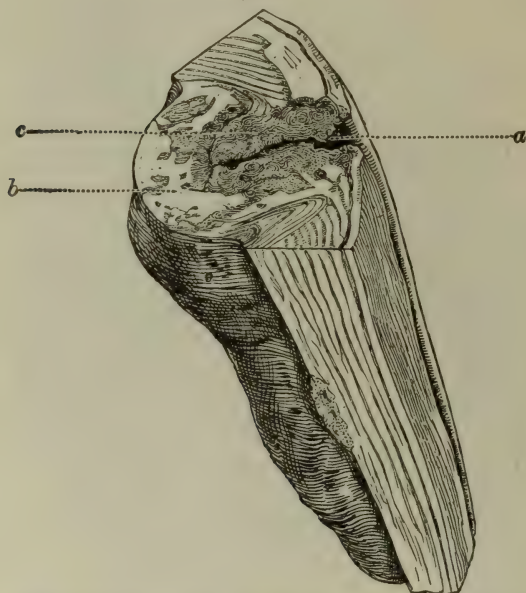
formed previous to the plug A, through the circular opening of which it can be seen. This cavity has evidently contained a greater or less amount of tissue which derived its nourishment through the base of the cavity, and which was finally shut off by the closing of the orifice by the plug A. The cavity has at present no visible connection, either external or internal. What its previous condition was no one can positively say, but judging from studies of those cavities which still retain open orifices, I have no doubt but that this cavity also once had a vascular supply, for the deposition of lime-salts is dependent upon such conditions. It must be borne in mind in studying these tissues that we deal with long periods of time in the development of the tissue, each layer of ivory representing perhaps fifty years or more.



In review, let me call attention to the fact that where cavities are formed in ivory there is never any appreciable loss of tissue, but always a bulging internally of the inner layer, which indicates that the cavities were made by a separation of the two layers,—except, of course, in such cases as are shown in a specimen in my possession where no doubt can exist regarding the origin of the cavities. But I do not value the evidence of this specimen very highly, as the external layer has been lost, and the pulp-canal is not shown. I searched diligently for such specimens, but was unable to find any better than this one.

This now brings us to the consideration of purely traumatic lesions

FIG. 6.



a, Longitudinal Split; b, Inner Layer Normal Ivory; c, Pathological Ivory.

occurring in tusks. The most common is complete fracture, and it is surprising how many broken pieces of tusks may be found in stock. This is accounted for by the dealers in the fact that elephants use their tusks as instruments of defense. This is also the principal cause of splitting, though this condition is not as frequent as fracture. The consolidated end of a tusk is not easily broken, but when we take into consideration the immense strength of the elephant, this does not seem strange. The strangest part is that fracture does not occur more frequently. The tusks are also often fractured by being struck by rifle-balls. It is impossible for a rifle-ball to enter the *solid shaft* of a tusk; consequently when balls are found im-

bedded in the substance of the solid tissue, they must necessarily have penetrated the tusk at its base, and been carried outward by the growth of the tusk, or else penetrated into the pulp-cavity when the tusk was composed of a thin shell, and afterwards been built into the tusk by the development of ivory,—pathological at first, and afterwards normal, provided such a layer exists. This point seems to have been entirely overlooked by those who have discussed the question, but it is worthy of remark and emphasis in the discussion of fractures.

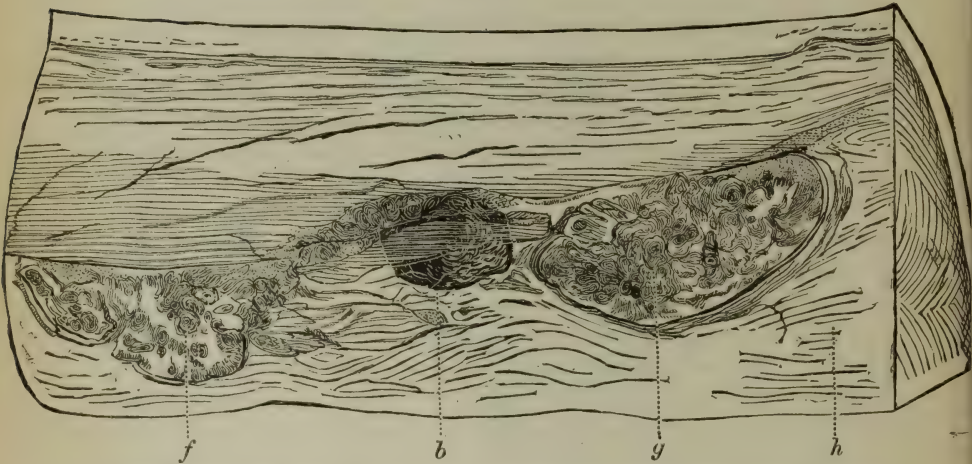
Let us now consider specimen No. 6 (see Fig. 6). This longitudinal split evidently occurred when the former layer of ivory was perhaps not more than one centimeter thick. The pulp immediately made an attempt to repair the slit, as evidenced by the pathological layer occupying both sides of the crack. On account, no doubt, of the constant motion of the two sides, union did not occur until the crack had increased to the depth of  $1\frac{1}{2}$  centimeters. No healing, however, took place until there was an exalted and highly stimulated condition of the formative cells along the entire line of the fissure, as verified by the heavy ridge which encroaches upon the pulp-cavity.

The fracture in this particular instance was nearly two feet in length, being deepest at the end towards the apex. Here we find repair after fracture of solid ivory, not by union of the fractured walls, but by an internal bridge which extended across the line of fracture; and that, gentlemen, is my idea of the reactive ability of dentine. You will always find it expressed upon the surface of the pulp, which is the formative organ. A better illustration of the point in hand could not be furnished. Positive evidence that the mobility of the walls of the fracture had much to do with its apparent depth is seen at the thinnest end of the specimen, where the line of fracture extends into the bridge of repair.

Specimen No. 7 (see Fig. 7) could be bettered only by the presence of an imbedded ball at the point indicated by the drawing (marked *b*). Specimens with ball or spear-head *in situ* are very rare. I have heard of only two such in all Germany. The one with a spear-head *in situ* I have not seen, but the other is in the possession of the Dental Department of the University of Berlin, and I had the pleasure of examining it twice. The specimen which you have the opportunity of seeing to-night is almost an exact counterpart of the one in the Berlin Museum. The tusk from which this piece was cut was quite fresh, and the markings do not show as plainly as they will when it becomes dryer. The dry *pericementum* on the lower two-thirds of the specimen shows that the tusk was still imbedded up to the point of the entrance of the ball or spear, even at the time of

the death of the animal. The missiles entered the base of the tusk when it was less than one centimeter in thickness, and which at that time consisted of the cortical and one other layer. The ball or spear passed entirely through both and entered the pulp-cavity, and the circumscribed nodules *f* and *g*, together with the pathological tissue immediately between them, were the result of an inflammatory reaction upon the part of the pulp. The entrance was completely healed by external as well as internal deposition. At a later date the internal layer *h*, was developed and enveloped the pathological nodules *f* and *g* in its substance. The cut that was made off the face of this specimen, on the inner or pulp side, had been removed before I saw it, but the dealer assured me that it presented the same

FIG. 7.



*f* and *g*, Pathological Ivory; *b*, Point in line of entrance of Ball through Outer Layer; *h*, Internal layer of Ivory.

bulging which is so characteristic of all the cases where imbedded nodules are found. This particular dealer was a very intelligent man, who had given much attention to pathological conditions, and imparted valuable information on the subject. It was he who brought out the point of the bulgings upon the inner surface of the tusks. He said that they invariably indicated either a nodule or a cavity, and as cavities, as a rule, had openings either externally or internally, those specimens that presented neither were safely said to inclose nodules. Business interests, of course, had quickened his observation in this particular, handling as he does large quantities of ivory yearly. The value of a tusk is largely depreciated by the presence of cavities and nodules, and about the only indications of their presence are these internal bulgings. The developed layers of



ivory are not subject to displacement, and these bulgings must necessarily arise in the process of development, and thus demonstrate that the pathological condition inclosed, be it either cavity or nodule, was produced, not in the substance of the ivory, but in connection with some pathological condition relating to the pulp.

Hoping that the specimens may afford profitable study to the members of the society, I will close with the reassertion of our basal proposition,—that all pathological conditions found in the substance of enamel or dentine have their explanation in either a faulty development, traumatic injury, or a disintegrating agent which lies without and beyond the control of the tissues under consideration.

### A BRIEF DISCOURSE ON NUTRITION.

BY C. M. WRIGHT, D.D.S., CINCINNATI, OHIO.

DON QUIXOTE: "But reach hither thy hand, Sancho, and feel how many teeth are wanting on the right side of my upper jaw; for there I feel the pain." Sancho put his finger into Don Quixote's mouth, and feeling about, said, "How many teeth had your worship on this side?" "Four," answered Don Quixote, "besides the eye-tooth, all perfect and sound." "Think well what you say, sir," answered Sancho. "I say four, if not five," answered Don Quixote; "for in my whole life I never had a tooth drawn, nor have I lost one by rheum nor decay." "Well, then," said Sancho, "on this lower side your worship has but two and a-half; and in the upper neither half nor whole,—all is as smooth and even as the palm of my hand." "*Unfortunate that I am,*" said Don Quixote, hearing these sad tidings from his squire; "I had rather they had torn off an arm, provided it were not the sword arm; for thou must know, Sancho, that a mouth without teeth is like a mill without a stone, and that a diamond is not so precious as a tooth."

This scene and conversation were recorded by Cervantes just three hundred years ago, and we learn that the chivalrous knight of the sorrowful figure seemed to appreciate fully one, at least, of the several functions of the teeth, "for a mouth without teeth is like a mill without a stone."

If we could have before our minds a clear and full impression of the alimentary canal of a "higher animal," and could see it work; could follow the entire process from the mouth downwards; could observe all the changes, and all the means of effecting the changes in the cooked and uncooked products of the animal and vegetable kingdoms which we call food-stuffs; if we could follow these processes as we can the operations of a paper-mill at one of our exposi-

tions, let us say, we should perhaps be tempted to cry out with Don Quixote that "a diamond is not more precious than a tooth;" because the teeth are the mill-stones in the continually progressing process of preparing and digesting food-stuffs for such animals. We who spend our lives in repairing and caring for this part—the *vestibule*, as it were, of the alimentary canal of man—ought to be able to say, if we could lay aside all interested considerations, just how precious a tooth is; and I think we can say that perhaps no part of man's apparatus for the reduction and solution, or digestion, of food-stuffs could be so easily dispensed with, or replaced by other means so readily, as the teeth. A tooth, then, is not as valuable as a diamond, unless it is beautiful in shape and position and assists in producing agreeable expressions of the passing emotions of the mind as recorded in the human face; and unless, at the same time that it is a thing of beauty, it is also a stone in the mill,—useful in the economy.

The modern dentist has been accused lately, by a writer for a medical journal, of having become so imbued with the idea of the importance of saving every tooth, or rather of not extracting any tooth that can be made *tolerable* in its socket, that he is oblivious to the broad view of the health of the entire body in his narrow view of his own art. He fails to observe that a tooth may be a means of injurious irritation, producing reflex troubles in the organism, these troubles manifesting themselves frequently in the special sense organs of the neighborhood—the eye and the ear. The accusation is in the main true against the better class of dentists, and possibly similar accusations might be brought against all so-called specialists. There certainly is a tendency of the human mind to magnify the importance of things which occupy its special attention. We do, no doubt, too often forget that the natural teeth of man can be dispensed with without perceptible detriment to the general health, and that often it were better that one tooth should be cast out rather than that the function of the entire organ should be destroyed. To stick to Don Quixote's simile about the mill-stone, we might say, that a mill-stone with a flaw is of no value, and that the miller should rather try to pulverize his corn in a mortar, with a pestle or a hammer, than by the use of the imperfect mill-stone.

We are prone to ignore, in the study of our fine methods, what we should wish to accomplish. We must not forget that a handsome artificial tooth-crown, set in the most ingenious of our many methods, upon a tooth-root, is of no value if that root has severed its friendly relations with the central nervous system of the body, so that it cannot call for an extra blood supply in case of need, as every healthy tissue can; if it cannot set the vasomotor nerves at

work, and influence the entire circulation and the action of the heart, and prove that it is still a part of the organism. Even if it could do this, and when pabulum is supplied by other than perfectly natural stimuli, if it is so weak, so degenerate, that on such an occasion it could not take up the food offered to it, and satisfy itself with it, and give off its proper waste, but must remain like a thorn in the flesh, of what beauty or value is the method of our art? The tooth is a living part of a living body. It is a part of the organism, and it is under the same laws that govern all living matter, whether that living matter be formed in a seed of a plant, an amœba, a bacterium, or the brain of a man. Each atom of living matter in the universe, whether it be found floating in an apparent independence in the air about us, or is dredged from the depths of the sea, is subject to the laws of all living matter,—is subject to the laws of nutrition.

There are three things indispensable to what we call nutrition, whether of the living atom or the complete organism of the most perfect animal. These three things are, first, a supply of proper pabulum; second, the condition of the organism to be able to satisfy itself, to appropriate, to take in this pabulum,—or the power of assimilation; third, the means or power of getting rid of the results of this metabolism,—the waste, the ashes, the effects of its own activity. We know how true this is in regard to an animal. We know that the study of anatomy and physiology seems to be only a study of apparatus for the taking in and dissolving and circulating and burning up of vegetable and animal products, and the getting rid of the waste, the results of the combustion, and that the sole object of the organism seems to be to seek for and take in, from earth and air, food; to burn up this food in its tissues, and to return the products to the earth and air. It seems to be the sole design of all the beautiful arrangements of the organs and tissues, even of man, to enable him simply to eat, drink, and be merry,—and die. When we follow the life-history of a little jelly-like speck of living matter, too minute to be observed excepting by powerful magnifying lenses, we observe the same thing. The little jelly-like speck eats, drinks, is merry, and dies, leaving other little jelly-like specks to follow the same everlasting destiny.

We have come to regard the science of medicine as based upon these facts. Its physiology is the proper action of the organism in reference to normal income and normal outgo. (In a physiological state every tissue, as well as the entire body, is merry.) Its pathology is simply a variation, more or less, in reference to the proper action of these things; and its therapeutics is an attempt to regulate the income and outgo. While this is the law for the whole



body, it is the law for every part, and the specialist who proposes to attend to the pathology and therapeutics of a part can no more cut himself off and say, "I treat the ear, the eye, the tooth, and let the general practitioner take care of the body," than could the rudder of a ship say, "I turn whichever way I please, absolutely independent of the general motions of the ship. Let the engine work the propeller as it pleases; let the wind blow against the sails as it listeth; they too, are specialists (brought up in different schools); I, as the rudder, will take care of my own department."

We can no more separate the tooth from the laws of nutrition, and retain it in the tissues of the body, than we can expect a glass tooth or a leaden tooth to be brought under these same laws, and attain the power of assimilation, no matter where it might be implanted in the tissues.

The tooth, then, being a living body, capable of taking up pabulum, using this pabulum for its own benefit, and giving off its waste, like every other tissue, must remain in physiological relations with the entire organism. And it is our business to maintain these relations between the tooth and the entire body, if possible. When harmony is lost beyond our power to recover it,—when from malposition of one tooth or an entire set, or from any cause, the beauty of the patient is impaired, or the use of the set of teeth as an organ of mastication is destroyed, a tooth, or a set of teeth, is of no more value than a rudder which cannot be made to answer the steersman's wheel. Cut it off, then, and depend upon the compensating energy of the engine and the sails! This is our work; and it is a great one, if we do not take too narrow a view of it. We grope about in the twilight. We do not see clearly what goes on just below the surface. We are not settled in our opinions about the morphology of the tissues; but we have seen some things which teach us that when we cut into the dentine of a tooth with our engines or excavators, even though the sense of pain has not been awakened, we have made an impression upon the central nervous system, which will call into council the heart and every organ of the body; and measures will be taken, assisted by every active tissue, to protect that tooth from the threatened danger.

The apparently slight irritation of a peripheral pinhead excavation made in the progress of dental caries on a molar tooth, though giving no notice to the sensorium of the man, will call out increased nutritive energies of the dentinal pulp, and it will immediately begin to protect itself, as it were, with the product of its increased activity. Who would call this a purely local affair? Has the general circulation not been affected? Have the nervous centers no hand in the matter? Have the remotest tissues of the body not sympa-

thized with the tooth? What whispers has the blood carried in its flying visits to the living cells of other tissues?

A delicate instrument, capable of marking every change in income and outgo, would show a variation in the nutrition of the whole body, on account of this little "dental caries" affecting one molar in this strong man's mouth; for where does the tooth get its nourishment if not from the food which it helps to grind, and which passes on to the embraces of the solvents in the different parts of the factory?

Two or three years ago a dispute arose in the Mississippi Valley Dental Society in regard to the question of whether "dental caries" could be called a *disease* of the teeth or not. May I be pardoned for making the apparently dogmatic assertions, that "dental caries" in a living tooth is a disease which, without reference to its etiology, affects not only the tooth, but more or less the entire organism, and that the dentist of the future will, when examining a simple "cavity" in a tooth, have before his mind's eye the entire panorama of the dependence of one tissue of a complex organism upon every other tissue, in its relation to nutrition. The dentist of the future will know, when he operates upon a tooth for the obliteration of a cavity of decay, or for the removal of injurious deposits about the neck, that his object is to place the living tooth in a condition of harmony with the nutritive functions of the entire organism; and that this last simple mechanical operation of "scaling" the teeth is just as much of a local remedy as is the administration of aconite as a cardiac depressant, and no more.

We may have separate schools for special instruction in our art. We may have separate journals for the dissemination of views relating to our art, the subject-matter of which cannot be of any more interest to the general practitioner of medicine than would detailed accounts of obstetrical cases be to us; yet, the science and art of dentistry can have no other foundation upon which to rest than that which must support "general medicine." The gynecologist falls into routine ways of practice, as does the dentist; but biology, in its departments of morphology and physiology, *must* form the foundation of both their arts.

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## PROCEEDINGS OF DENTAL SOCIETIES.

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### NEW YORK ODONTOLOGICAL SOCIETY.

THE New York Odontological Society held its regular meeting Tuesday evening, February 8, 1887, in the parlors of the New York Academy of Medicine, No. 12 West Thirty-first street.

The president, Dr. E. A. Bogue, in the chair.

## INCIDENTS OF OFFICE PRACTICE.

Dr. J. Morgan Howe. A day or two ago I received a sample of absorbent cotton from the Lister Manufacturing Company, of Bloomfield, N. J., and have been so much pleased with it that I have brought a sample with me for your inspection. Cotton is less important to us since the use of Japanese paper has become so common as an absorbent, and yet for the roots of teeth cotton is, I think, preferable to paper. It is more convenient, and is more easily removed from the root-canals, because moisture does not destroy its tenacity as it does that of paper. I can demonstrate the absorbent qualities of this cotton very quickly by dropping a pellet of other absorbent cotton together with a pellet of the Lister into a glass of water. You see how much more quickly one is wet than the other; the bit of Lister cotton absorbing the water immediately. I have also some paper here which is as good as any I have ever had, and on comparing it with the Lister cotton by the same experiment you see that the cotton is as absorbent as the paper; it is wet and sinks in the water just as quickly.

Dr. S. G. Perry. I have for quite a number of years used raw silk in the roots of teeth, the fibers being long, very tenacious, and easily removed from the canals. As to its absorbent quality, I have never made any comparative tests, but it is quite sufficient for drying the pulp-canals, and as a carrier of medicines into the roots I have never seen its equal. I have used paper for many years, rolled to a sharp point as fine as a needle, for drying the interior of roots. Wherever medicine is to be used in root-canals, and it is necessary to dry their fine extremities, I should be afraid of losing the paper if I used it, and for that purpose I prefer the raw silk.

Dr. E. H. Raymond. Little things are frequently of great assistance to us in our operations; therefore I take the liberty of presenting some glass mouth-pieces for use with the saliva-ejector. They are made for me by the gross, and are simple and neat. By using a new one for each patient, it is the perfection of neatness, and it is always gratifying to your patients to see that you appreciate *their* regard for the sweet and clean. It is necessary to make one or two small apertures near the end of the tube—which can easily be done with a corundum-disc—to prevent the soft tissues stopping the flow of saliva. I mix zinc-phosphate upon a heavy glass paper-weight, two inches wide by four inches long. It does not move while mixing the cement, which enables me to do the mixing with one hand. I present also a set of instruments which I have devised for holding the rubber-dam above the margins while filling cervical cavities. They can be held by the left hand of the operator or by an assistant. I seldom make more than one hole in the rubber in filling these



cavities, through which the tooth to be operated on is passed. By saturating the gum with cocaine, I am enabled to carry the rubber up beyond the free margin of the cavity, and hold it firmly in place without causing pain.

Dr. Perry. There is another use for glass tubes, as I have found out within a few weeks. For some time past I have been filling certain cavities with gold by using points made from the ends of glass tubes. The tubes are softened in a lamp-flame until the glass is malleable; then brought down to a point, the shape being varied somewhat to meet different cases. I do not know that it is safe to speak very confidently of a method of filling teeth that I have used for so short a time. I can only say that I have used these glass instruments in quite a large number of cases, from day to day, and in the treatment of certain cavities I have thought there was perhaps a slight gain in their employment. I have filled some extremely frail teeth with them, with results that were, I thought, beyond what I could have secured in any other way. The gold is rubbed against the walls of the cavity in the same manner as Dr. Shumway did many years ago with his ivory points. When he introduced those points I used them for some time, but finally abandoned them. There seemed to be an oily quality in the ivory that led me to think that gold did not cohere as well to a surface that had been rubbed by it. I think that objection does not obtain in the use of glass points, because they come directly from the lamp flame, and are smooth and glossy, leaving the surface of the gold so that the next piece coheres readily. While they are very frail and but little force can be applied in their use, I am not so sure but that is an advantage, for I have found that when the surface of the gold is rubbed very hard and persistently the next piece of gold does not cohere well. Very little pressure is required in rubbing the gold on, and the points leave a smooth surface with a very firm condition of the gold. If a point breaks it is only necessary to heat the glass a little in the flame of an ordinary annealing-lamp, when it can be drawn out in a moment and give any form desired. The end of the tube rolls up naturally and takes a globular form, which is often desirable. It may, however, be flattened with a pair of pliers into the form of a hoe-shaped or hatchet-shaped burnisher. Patients have asked if there was any danger of the point breaking and falling into the throat. My reply has been that there is no danger when the rubber-dam is in position,—and it always should be, for they can only be used in packing strictly cohesive gold. I have only used the Morgan & Hastings or Globe No. 4. This I ordinarily fold about four or six thicknesses; then cut it in strips in the ordinary way, as it is used with the electric mallet. I cannot answer for these instruments with any other gold than

this. I have placed a few of these glass instruments in wooden handles, and they make good burnishers. About as much force as is necessary can be applied, and they make a finish against the marginal walls superior to any steel instrument I have seen. They do not clog the gold, but work smoothly. I have a set of agate points and handles for supplementing the Herbst method by hand-pressure. I used these agate points before employing the glass points, but recently I have used glass almost entirely. There is a certain advantage in the glass points, it seems to me, for use in supplementing the Herbst system, for with them places that cannot be reached with the rotary instrument in the engine can be properly filled. I have put in quite a number of very elaborate contour fillings with them, working several times through pretty narrow places, and making perfect restorations without trouble. I think Dr. Woodward can assure you that he saw several such fillings that were made easily and quickly, leaving a surface upon the gold that was equal to any that I have seen from any other instrument. I do not know that I would except the Bonwill mallet or the electric mallet, so far as the fine surface of the gold is concerned.

Dr. Howe. What is the time required as compared with the mallet?

Dr. Perry. I do not know, for I have not tested it in that respect. I do not think there can be any gain in time; yet I think the operation can be made quite rapidly with them after long use and with more experience. Another point: They have the same quieting effect on the patient as Dr. Shumway's ivory points, or the Herbst rotary motion. Patients like them very much, for the operations are easy and there is but little strain on the nervous system. The Herbst rotary instrument will, I think, make the gold take hold better than anything else, because you can use more force, and perhaps the rate of speed is such as to develop heat and to produce an electricity that makes the gold more adhesive.

Dr. John B. Rich. It must develop a certain amount of electricity. Undoubtedly that glass surface—which they call a fire-polish—is the most perfect burnisher known.

Dr. Perry. If these glass points, after a longer trial, prove to have no value for filling even very frail teeth, I think they will still have merit as burnishers. I have never used any form of burnisher that could be compared with them. Another reason for showing them is to call attention again to what Dr. Shumway has so long claimed, that gold can be very perfectly adjusted to the walls of cavities with the expenditure of very little force.

The President. Will the secretary please read a communication

from Mr. Alfred Poirier, of Paris, who has kindly sent for our use a few models of the upper and lower jaws in an interesting case.

#### ANATOMICAL REPRODUCTION OF THE DIFFERENT PARTS OF THE MOUTH BY MODELING IN WAX.

Gentlemen: The plaster models which are usually employed to reproduce anomalies of the mouth, the deformities resulting from certain diseases or accidents, etc., neither offer the distinctness nor the clearness necessary to give a comprehensive idea of the organ represented. It was in order to supply this deficiency that researches were undertaken the results of which I have the honor to present to you.

The anatomical specimens, modeled in wax, appeal to the understanding by the fidelity of their form reproduction and their fine tints. I have endeavored to make my models life-like, and above all to discover a method which may be employed with facility by all dentists, and which at the same time may be economical.

After fruitless trials with godiva, plaster, gelatine, and clay, I have chosen putty for taking the impressions, which in this substance have an irreproachable delicacy and do not shrink.

The teeth are first poured in this model; then after being retouched and corrected they are replaced in a second impression, into which is poured the pink wax for the gums, care being taken to pour in only a thin layer; upon this last the darker wax is poured in as small a quantity as the first, and then the whole finished by filling up the mold with plaster.

In order to consolidate the impression and prevent it from being distorted during these manipulations, it should be inclosed beforehand in a cylindrical sheet-iron box.

Upon removing the impression the model is complete. To give it the finish necessary, and to the gums the appearance of being wet by the saliva, cover it with a coating of sandarac varnish.

Now we have only to tint the parts affected by inflammation, decay, tartar, abscesses, etc. This is done with water-colors mixed with honey. I have demonstrated that the wax models when finished in plaster preserve the exact dimensions of plaster models, and that any apparatus which would fit the one could be used upon the other with equal accuracy.

The President. Gentlemen, I take pleasure in announcing that Dr. Littig is present this evening with a patient in whose mouth he has placed an obturator, and we shall now be pleased to hear what he has to present.



## CASE OF CONGENITAL FISSURE OR CLEFT-PALATE.

Dr. J. Bond Littig. Gentlemen, I wish to present for your consideration this evening a case of congenital fissure or cleft palate, for which I have made an obturator. I do not show this as anything new, but simply to demonstrate the utility of the Suersen appliance, which to my mind is so very simple that any dentist with but ordinary mechanical ability can make and apply it without difficulty. The mechanical details of its construction have been so well set forth in Dr. Kingsley's work on "Oral Deformities," and more recently by Dr. Weber, in the June number of the *Independent Practitioner*, 1885, that I consider any further remarks under this head as unnecessary at this time.

The patient is so well pleased with the improvement made in his articulation, since wearing the appliance for about one year, that he has kindly consented to be present this evening, that you may all see the advantages derived from wearing a simple rubber bulb.

The only difference in this obturator from those already alluded to is that, instead of making the bulb hollow, on account of weight, I have filled it with thin aluminium, which I think simplifies its construction. This patient has had but little training since the completion of the obturator, and we all know that training is a necessary adjunct to perfect articulation. I have noticed one fact which I have never seen in print,—that after wearing an obturator the patient can articulate much more clearly, even without the appliance, than he could before its introduction.

I will state here that before this obturator was introduced the gentleman was not able to use the telephone with any success whatever, but he uses it very readily now. If the improvement continues as it has for the past year, I am very much inclined to believe what Suersen claims for the appliance,—namely, the development of the superior constrictor muscle of the pharynx as the prime mover in articulation; and I think this patient will soon articulate so plainly that no one will notice any defect whatever in his speech.

[Dr. Littig's patient read a few lines without the obturator, articulating with great difficulty; then the Suersen instrument was placed in his mouth, and he again read. The improvement in his articulation was so marked as to elicit applause.]

Dr. J. Adams Bishop. I am very glad that Dr. Littig has given this society an opportunity to see the practical workings of this obturator. Although it is not our every-day practice to treat these cases, I think we can all fully appreciate the results of the treatment in this case, having seen and listened to the patient.

I would introduce here three cases in which I made use of this obturator:

I. In November, 1869, I placed in the mouth of a lady one of these obturators, which has been constantly worn to date. Models of the mouth and obturator were at the International Exhibition at Philadelphia in 1876, and a history of the case was printed in the *New York Medical Journal* in 1878. The obturator was made of red rubber, and the former defect in the speech would not now be noticed under most circumstances. One peculiar feature of the case is that the lady always retains the obturator in the mouth at night, as well as by day, and claims that its presence greatly softens the air as it passes down into her lungs,—though I cannot explain how that can be.

II. In October, 1871, a gentleman about fifty years old came to me, after he had availed himself of all the instruments introduced into the profession up to that time, and was therefore fully competent to judge of the worth of this one. He pronounced it the most comfortable he had used, and said that it enabled him to articulate with ease and distinctness.

III. Dr. Gurdon Buck, in his "Reparative Surgery," published in 1876, reports a case (folio 148) treated by me in October, 1874. In concluding he says: "The plate, when finally adapted, was worn with much comfort, and the characteristic defect of articulation, which had existed in a marked degree, was almost entirely corrected."

I would now like to call your attention to four distinctive features of this plate: First, the simplicity of its construction, which allows of its being made and adjusted in a short time, compared with a velum instrument; second, the plate being made of one piece, and having a good support in the mouth, sustains all the soft parts in the action of talking, eating, and drinking; third, the heat of the mouth has no effect on it, as on the soft velum, which after being worn a month loses its form; fourth, another point in its favor is the ease with which it is kept clean, the finely-polished surface causing the mucus, etc., to pass off from it without remaining as it does on the soft velum, as is proven by the testimony of Dr. Chas. W. Stearns, now of Springfield, Mass.

Dr. Littig. I have made several obturators with the hinge and spring, but I do not know that they have any advantage over the one I have exhibited here this evening.

Dr. Bishop. None at all. Here is the most perfect instrument that we have, I think, as instanced by the claims of the case first quoted.

The President. We owe our thanks to Drs. Littig and Bishop for

their kindness in making these explanations, as well as to this gentleman who has permitted us to examine and test his appliance. I can hardly refrain from expressing my surprise that so few of the changes that have been made during the last few years in these appliances and the results that have been reached should have come to our notice. There are, as I have had occasion within the last twenty years to know, a great many gentlemen of our craft who are making apparatus of one kind or another to remedy this difficulty, but we do not often have the pleasure of seeing them. I wish we did. It was work upon such devices that brought me to New York originally, and I have had some experience with them.

Dr. Howe has consented to say a few words this evening concerning devices for regulating teeth, and we will be pleased to hear from him at this time.

#### DEVICES FOR REGULATING TEETH.

Dr. J. Morgan Howe. I do not expect to present anything this evening that will be new to many of you; only some thoughts on devices which have been very useful to me in regulating.

As in other things, the adaptation of the means to the end in view determines very much the promptness and measure of our success in efforts to regulate teeth. After this, simplicity is of prime importance, and complication of construction in appliances should be avoided.

The teeth, even in difficult cases, are not moved through such a great distance that it would necessarily make operations of this kind very tedious or troublesome; and yet the fact is that regulating cases are frequently among the most troublesome and the most tedious of any service that we have to perform. I think this is largely due to lack of adaptation of the means to the end, resulting in accidents and slips, which cause loss of time, by undoing perhaps a week's work in twenty-four or thirty-six hours. It has seemed to me that the advantages of metallic bands and caps cemented to the teeth by means of zinc-phosphate have not been appreciated as they deserve. A tooth on which such a band is fixed is not injured, but is even protected, at the part covered by such a fixture; detritus of food and the secretions being completely excluded. By making the bands of very thin platinum—as thin at least as number four gold foil—they occupy little space, and can easily be thickened and changed in shape on the outer surface by soldering on pieces of gold so as to present to the force applied a surface at right-angles, instead of the smooth inclined plane which we often have. With such a buffer, as I may call it, we have an opportunity of exercising power without the liability of slips or derangement of the fixture that could hardly be



obtained in any other way. Such bands also afford accommodation for hooks for the attachment of ligatures, with a good degree of certainty that the ligatures will neither come off nor slip up against the gum. Such hooks may be made long enough to serve as levers for rotating a tooth, or for the attachment of a lever—as a wrench is applied to a nut—which may be removed and bent to suit the requirements of the case as it progresses.

I invite your attention to this cast, with a lateral in need of rotation, together with the appliance,—a vulcanite plate to hold the other teeth still, a band around the lateral, and a lever applied,—to show how convenient it is to be able to put on and take off such a lever, and to have it perfectly firm and reliable when it is on the tooth. This lever is made by bending a small piece of gold plate to conform to the shape of the tooth on the side to which it is to be attached. A piece of wire is soldered to one end, on the convex side, to serve as the long arm, and a hole is made at the other end to slip over the hook on the band. The short arm exerts force against this hook, and the fulcrum is under the concavity formed as described. I have found that this little device would accomplish its purpose without danger of slipping when accurately made.

The screw is often the best means for the application of force, and I usually insert it in the hard rubber of the plate for a nut, instead of using the manufactured jack-screws with the metal nut. I have a case here in which the screw runs in the hard rubber against a band on the tooth; a lateral incisor which was inside the arch and proved to be exceedingly resistant to other means for the application of power, I suppose on account of its close proximity to the developing cuspid. This appliance moved the tooth into its proper position very quickly.

Dr. Littig. Is the screw vulcanized in?

Dr. Howe. There is an objection to that; the screw may stick and refuse to be turned. A better way is to drill a hole, a trifle smaller than the screw, and let the screw cut a thread in the rubber, which it will do very nicely if a little oil and some care are used. For the application of force I think it is often unnecessary to take the trouble to use a screw. I think the rubber ligature is one of the means that it is not desirable to do without. It is troublesome and annoying sometimes to find just the kind of ligature desired. I have no doubt that many of you have been in the habit of using ligatures cut from rather heavy rubber, such as is sold for dam. Small strips with a hole punched in each end serve such a purpose very well, and very small rings may be made by trimming around a hole made in the dam. Such ligatures occupy very little room between and around the teeth, and serve the purpose when light, small

rings are required much better than any rubber tubing that I have knowledge of.

Dr. V. H. Jackson. I have had some experience in the use of the screw in rubber plates, and the simplest and best method that I have discovered for making a thread in the rubber is to first use a drill somewhat smaller than the screw that is to be inserted; then fill the hole with wax, warm the screw a little to soften the rubber, and screw it into the plate while it is warm. By this means I get a beautiful thread.

In regard to rotating teeth, I have had very good success with an appliance very similar in construction to Dr. Brophy's band matrix, which I have used several years. It is simply a metal band fitted to the tooth that is to be rotated, and thickened on the lingual side, where a hole is made with a thread cut in it, to serve as a nut, for the reception of the lever. The band is fastened to the tooth by means of zinc-phosphate, the lever screwed into the nut before the phosphate hardens, and a rubber band stretched from the end of the lever to some tooth that will apply the force in the desired direction. The post can be set into the band at any desired angle. This makes a very nice fixture, and if the tooth be of favorable shape a permanent and effective one.

I understand that the plate that has been spoken of here cannot be removed by the patient and cleansed. The regulating plates that I make can be removed by the patient for that purpose.

I have obtained very much better results by using the spring pressure. The spring is made of piano-wire, according to a system introduced by Dr. Coffin. I can move teeth by that means more rapidly than by any other method that I am acquainted with, and with less trouble. The patient is able to take the plate out at any time. I would be glad to show, at some future time, models of such cases with the appliances used, if they would be of interest. The plate is never in sight. I do not use the large plates that cap the teeth, but secure the plate in position by extending piano-wire in the form of a clasp around the last molars; or if there is a space between any of the teeth the wire can be passed between and around them. A spring pressure I consider the least troublesome method of applying force, and the best for the patient.

Dr. Perry. Some years ago I had a habit of imbedding in the rubber plate before it was vulcanized a small piece of gold plate, and the hole for the reception of the post or screw was drilled at right-angles through both the rubber and the gold plate. This gave greater strength, and would hold the thread of the screw.

Dr. Jackson. I use silver wire quite extensively for making screws. It is more easily worked than gold, and is so inexpensive

that the posts or screws can be changed for others of different lengths whenever it may seem desirable. The teeth can be forced in an entirely different direction by simply bending the screws without changing their positions.

Dr. Howe. One of the points which I wished to make was this: The long continuance of a regulating appliance in the mouth, in semi-contact with the teeth, is always more or less injurious to them; especially is it so when metallic bands, points, or clasps touch the teeth. One of the advantages of the metallic bands that are cemented to the teeth is that the teeth which they encircle are not injured by the fixture, but are made thereby safer than they would otherwise be during the operation. The bands may also be made to offer the best surface for resistance and at the angle desired, with an indentation for the point of a screw, or adapted to any kind of a fixture. I think the worst kind of appliance that can be used, as regards the welfare of the teeth, is a metallic band attached to a tooth by any other means than that which will seal it against the secretions of the mouth and the débris of food which will insinuate themselves between it and the tooth.

Dr. Littig. Mr. President, I would favor Dr. Howe's statement in regard to metallic bands cemented over teeth. About three months ago I commenced the operation of turning a tooth in that way, and fastened the band with zinc-phosphate. The patient was taken sick, and I did not see her for several weeks. The other day she came in, and when I removed the band there was not a particle of injury done to the tooth. With any other appliance left in the mouth for that length of time, without being removed for the purpose of cleaning, the injurious effects would have been apparent.

Dr. Howe. Three months is not an unusual time for regulating apparatus to be in the mouth, and even if it is expected that the patient or the dentist will take it off every day to cleanse it—which very likely is not generally done—there would still be great risk of injuring the teeth.

Dr. Jackson. In one case of a very resistant tooth I found that the platinum yielded, and cement would not hold the band. I had at last to resort to the screw and wedging.

Dr. Raymond. I have a case that will perhaps be interesting, although it is not of a complicated nature. The superior cuspids, bicuspid, and first molars antagonized inside of the lower teeth. In order to expand the arch it was necessary to keep the teeth apart, to accomplish which I adopted the old plan of putting a vulcanite plate inside the mouth, covering the grinding surface of the teeth. Then, cutting the plate with a fine saw so as to bring all the pressure against the teeth to be moved, I put in a jack-screw and in four-



teen days have accomplished the result as seen in the model. The jack was placed between the bicuspid, and the first molars moved quite as rapidly as the former, much to my gratification. The patient is fifteen years of age.

[The President calls Vice-President Howe to the chair.]

Dr. E. A. Bogue. I had the unusual pleasure when in Paris of examining some models of a case the like of which has, I presume, troubled us all. It was the case of a young girl of thirteen years, a patient of Dr. Jules Colignon,—one of those gentlemen, by the way, who has carefully read the proceedings of the New York Odontological Society and annotated them. Just before I left Paris he brought me duplicates of his models of the case; and before reading the two or three pages which he has written I would like to pass around model number one (Fig. 1). If you will allow me, Mr. President, I will ask all the gentlemen present to carefully look at that one model first. You will notice that the lower incisors are striking the gums above. The patient could not close her lips; with great effort she could almost close them, but as a rule she looked like a fool. This case is one of a class that we read about, but of which I have long sought a practical illustration without success. It is easy if one knows how to manage it, but perhaps we do not always know how. At any rate, I am willing to confess that my own ignorance was so profound only a few years ago that I consulted about forty dentists in New York relative to a case similar to this, and Dr. Littig was the only man among them who gave me any information at all. He and I finally did agree upon one point; but no other man had anything to say about the case except "Don't touch it." Now that my friend, Dr. Colignon, of Paris, has worked this problem out, it was naturally a great delight to me to get these casts. I will read his short paper, which is translated after a fashion.

#### CASE OF UNDUE PROMINENCE OF THE UPPER JAW.

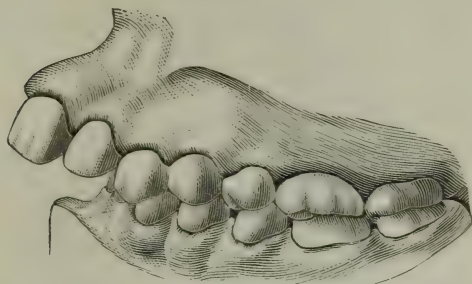
Gentlemen: I first saw the patient, Miss X, aged fourteen years, April 1, 1886. The curve of the upper maxilla was V-shaped (Fig. 2). The lower incisors articulated far behind the upper incisors, and marked their impressions in the upper gum (Fig. 1). The curve of the lower alveolar arch was nearly normal, and the positions of the lower teeth fairly good, but the lower molars were short.

Struck with the idea that it was possible to drive the teeth into their alveolus or cause them to elongate, on the 1st of April, 1886, I put in a rubber plate covering a part of the palatine vault, allowing the lower incisors only to bite upon the plate, but not allowing the molars to touch.

The first apparatus was worn from the month of April to the month of November. At that time the lower incisors presented their normal curves. The lower incisors appeared to have sunk into the alveolus and the molars to have elongated.

There was a space of three millimeters at least between the lower

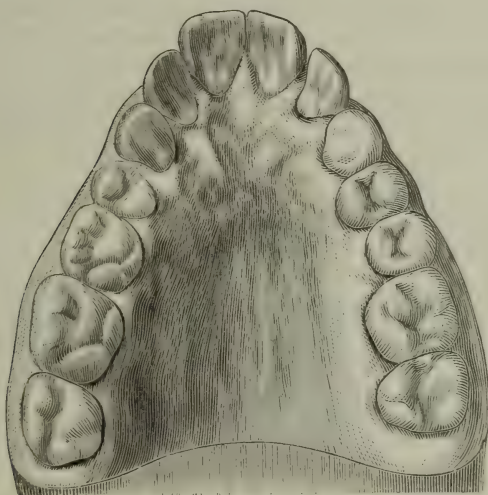
FIG. 1.



incisors and the roof of the mouth, so that the gums were no longer wounded by the teeth.

On the 3d of November I put in a second apparatus, for the purpose of separating the two upper cuspids, in order to enlarge the

FIG. 2.



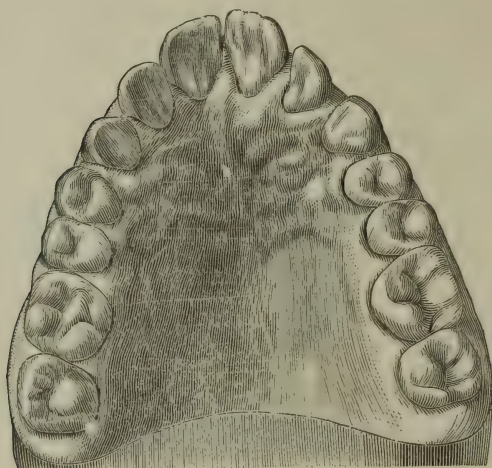
arch of the circle, and Fig. 3 shows the result obtained on the 22d of December. The incisors seemed to be drawn back fully a centimeter.

It will be well now to allow the back teeth to grow so as to articulate with one another. This will permit the superior incisors to occupy their normal position.

It is easy to demonstrate that nearly a centimeter of space has been gained between the cuspids, and I should like to call attention to the fact that no traction has been used upon the superior incisors to bring them to the position which they now occupy.

The separation of the cuspids sufficed to obtain the result shown

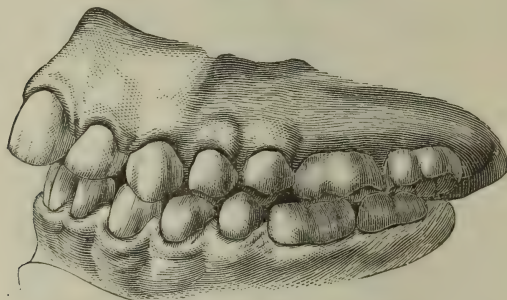
FIG. 3.



(Fig. 3); whence I conclude that in such cases as this it is better first to separate the cuspids rather than to use the drawing-in process upon the incisors that was formerly employed.

The space obtained by this separation permits the upper incisors

FIG. 4.



to take their normal position in the mouth, which is that of a flat arch, and not a V.

Room is gained for the lower teeth to come forward, producing the result that has been called "jumping the bite," for without this increase of room "jumping the bite" is seldom if ever possible.



It will be necessary to wear this apparatus for some time, and I do not expect time to modify in any way the result obtained (Fig. 4).

Dr. Bogue. The fixture that he used was simply a rubber plate split from the front to a little beyond the middle, with a gold screw in it to separate the two sides, and with metallic collars passing under the margins of the gums of the cuspids, so that as the plate separated these collars anchored around the necks of the cuspids still held it firmly. He put in two such plates, and the screws, which were not long screws, were turned out nearly their full length. Dr. Colignon had searched through Dr. Kingsley's book and other works in the vain effort to find out what "jumping the bite" meant. Although he has really done it, he did not seem to know what it was. But the result obtained is exceedingly gratifying. The point I noticed as the case went on was that the patient, who was two or three times in my office, could not at first shut the lower jaw forward; but when the cuspids were separated she could do it, and suddenly, perhaps within thirty-six hours, this result was produced. (See Fig. 4.) Just what happened I will leave to the gentlemen here to find out and state if they can.

Dr. Rich. It is an interesting feature that merely expanding the arch in that way should produce that result on the front teeth; but it seems to me a philosophic one, because this condition of the front teeth is not normal, and there is always a tendency in nature to resume normal relations when there is opportunity for it. I should think that from the narrowing of the arch the incisors were pressed forward, and it was therefore good policy to remove the strain by expanding the arch. I have always found in cases of that kind that there was some special cause for the teeth projecting, and that cause has generally been found to be the straight sides of the arch and the consequent V-shape. When the sides are expanded I think the tendency is always toward a resumption of the normal position of the teeth in front. It is evident that that was the philosophy of this operation, and the result shows that the philosophy is correct.

Dr. Littig. Dr. Bogue, do you think a person can bite back any further than is normal?

Dr. Bogue. I do not think an adult can.

Dr. Littig. Do you think a child can?

Dr. Bogue. Yes. I think that before the ramus is fully ossified, or the condyles ossified, a child can sometimes bite back considerably further than normal.

Dr. Littig. Would that not become a normal condition for that child?

Dr. Bogue. Yes, if no correction of the abnormality took place;

and there it seems to me that you hit the nail on the head. I would like to have you explain it when that model gets into your hands.

Dr. Littig. I do not think I can; but the drift of the paper seemed to be that as soon as the jaw was unlocked the normal condition of the bite was assumed, and I was asking whether that could be possible.

Dr. Bogue. I would like to ask for information also how this change here shown was produced. I have a theory myself which I would be pleased to speak about later, after others have spoken.

Dr. Perry. The movement of any body is in the direction of the least resistance. Is it not, therefore, fair to assume that every tooth takes a balanced position between the opposing forces,—the pressure of the tongue from within and of the lips from without? If those teeth moved back after the arch was widened, it was probably because the muscular pressure of the lips tended to force them back.

Dr. Rich. I had a little experience in a case of that kind, in which the deformity was entirely remedied by extracting the second bicuspid on each side. In the course of five or six months after the bicuspids were extracted the front teeth assumed what would be a normal position. I also had a case in the early years of my practice where the front teeth projected so much as to raise the lip and produce a lisp in the child's speech; and it was remedied in the course of a year and a-half by extracting the sixth-year molars.

Dr. Perry. Without artificial aid?

Dr. Rich. Yes, without artificial aid. It was a theory of mine at that time that such a condition was due to pressure consequent upon the flattening of the arch. Extracting of the teeth is not a mode of remedying the trouble that I would adopt to-day; but as the sixth-year molars were in that case considerably decayed I extracted them; and in the course of eighteen months the front teeth came down so that the lip could cover them and the boy could shut his mouth naturally. I dared to do this because the father of the boy—who was a gentleman of considerable scientific attainments—had some talk with me about it, and I expressed to him this opinion of mine that the extraction of those teeth would remedy the difficulty, and he was very anxious to see whether without the application of any artificial pressure that would be the result. The boy, when this was done, was about eleven years of age. He is a patient of mine to-day, and you would never dream that there had been any such deformity in his mouth. The articulation is perfect.

Dr. Littig. If Dr. Bogue had not presented this case I would have been very much inclined to say that the "jumping of the bite" had taken place in the model. From the nature of the pressure that was brought to bear, causing simply the spreading of the arch, I cannot

give any theory about the lower jaw having been brought forward, because I feel that a person cannot bite back any further than is normal.

Dr. Bogue. These models correctly represent the mouth as I saw it. There were four others who saw the case from time to time; and it seemed to me to involve many of the questions that were presented in the case that I asked Dr. Littig and the other confrères about a few years ago. I know these casts to be correct, and now I am going to disarticulate them so that we may study them separately. The theory I had was that when the child came to Dr. Colignon in that plight (see Fig. 1) there was an undue development of the superior maxilla, probably caused by thumb-sucking; there was a little retrogression of the lower incisors; the projection above was such that the cuspids dropped in from the strain upon the lips; ossification in the socket not being complete, the jaw was retracted and fell back a little. In a case like this any attempt to advance the lower jaw would fail because the lower cuspids antagonize against the inclined planes of the upper cuspids, the other teeth are prevented from touching, and the mouth remains partly open. In Fig. 1 it will be noticed that the first bicuspid below strikes behind the first bicuspid above. That is not normal; it is one tooth too far back. When the cuspids were spread and the child reached a point where the jaw could come forward and close the teeth at the same time, then this abnormal condition gave way to the normal condition (see Fig. 4), which the patient tried experimentally and found it went pretty well. The teeth being a little bit sore, she kept them apart, and before she knew it—inside of three days, I think—she had contracted the habit of biting forward, and almost immediately took to that.

[Dr. Bogue breaks the attachment of the casts.]

The upper incisors are not thrown back. She has absolutely "jumped the bite," and she was only able to do so because the cuspids were spread. It is not because the upper teeth have gone back, but because the lower teeth have gone forward.

Dr. Perry. Is the expression good?

Dr. Bogue. I believe it is. The defect is corrected, and the weariness which she complained of near the ramus has disappeared. I cannot understand it on any other theory. The girl was about thirteen and a-half years of age when the regulating was begun; she is now more than fourteen.

Dr. Perry. You think the child had unconsciously developed during those years the habit of biting backward?

Dr. Bogue. Yes, but it was not many years. This is perhaps an awkward way, Mr. President, to bring out an idea on the subject.



I found that my confrère on the other side of the water had searched unsuccessfully through our literature to find what "jumping the bite" meant, to find what principle was involved, and he does not know yet. He does not appreciate, according to that paper, that he has accomplished the feat. He thinks the upper teeth have gone backward; but, as I see it, it is not so. It seems to me that the major part of the movement has been a movement of the lower jaw forward.

Dr. Perry. The deduction from this theory would seem to be that we shall be able to treat more successfully many of those cases that have given us trouble heretofore.

Dr. Bogue. I had two cases of a similar kind in regard to which I spoke to Drs. Littig, Perry, Kingsley, and others,—cases that were carried through successfully, to all appearances. I have seen one of them within a week. A great many compliments have been received concerning them, but I have wondered whether those compliments were deserved. I did the best I knew how, and the result seemed to be good, but I was not satisfied. I am just as much convinced to-day that this course of treatment would have been successful in both of those cases as I am that I live. I am delighted that my friend on the other side has sent to us these models of a completed case.

While this operation was in progress there were a good many talks over it; and in the course of one of them Dr. Colignon said he proposed to turn these bicuspid teeth around straight, at least so that they should be vertical to a line passing from behind forward. He was asked, "What for?" "Because it is natural, is it not?" "Well," was the reply, "if that is natural, how then does the molar cusp catch into the depression of the antagonizing bicuspid and prevent it from going either forward or laterally." The doctor started as if he had been struck, and said he was ashamed of having practiced for twenty years without having ever thought of that before. He recognized it instantly when the idea was presented to him.

I believe there is at the bottom somewhere a principle that underlies this whole system of regulating, and which we have not yet arrived at. I think that if we study the development of the teeth, using such models as we can lay our hands on by taking impressions of natural teeth, we shall learn more about such matters than we now know.

Dr. Perry. Is it asking too much of you to repeat just what he did in that case.

Dr. Bogue. He put in a plate to strike the lower incisors and drive them down; he did drive them down into the sockets.

Dr. Perry. How long was that plate worn?

Dr. Bogue. Nearly six months. It was simply a rubber plate over the roof of the mouth, made thick in front for the lower incisors to strike upon instead of striking upon the gum above. Next a split plate was put in to spread the cuspids apart; and the next was another split plate to spread them still farther apart. That is all. Nothing else has been done.

Dr. Perry. Was that plate worn persistently, night and day?

Dr. Bogue. Yes.

Dr. Perry. This is the most interesting case of irregularity that I have seen exhibited before this society in a very long while.

Dr. F. A. Roy. I think it possible that those lower teeth were not moved forward to "jump the bite." If an ordinary articulator is studied, I think an idea will be obtained enabling one to see that opening the bite might give the teeth a chance to come down and close naturally. That, together with the broadening of the arch, might be sufficient to account for what has happened in this case.

Dr. Bogue. I am happy to see that some of these gentlemen, for whom I have a high regard, as being both theoretical and experimental experts, are as much puzzled over that result as we were.

Dr. Jackson. The case of regulating that has been presented is quite an interesting study. I have a patient that I have taken two articulations for in putting up a partial lower plate, and each time the bite was too far back. The patient is thirty-two to thirty-five years of age. I would be glad to show the case to any one who wishes to see the articulation. I have never before seen a patient who could bite back so far.

Dr. Littig. It is a common thing for a patient to get in the habit of throwing the jaw forward abnormally. I think the case you speak of was one of that kind; the anterior bite was not the natural one.

Adjourned.

S. E. DAVENPORT, D.D.S., M.D.S.,  
*Editor N. Y. Odontological Society.*

# FIRST DISTRICT DENTAL SOCIETY, STATE OF NEW YORK.

THE First District Dental Society of the State of New York held a regular monthly meeting, Tuesday evening, February 1, 1887, in the rooms of The S. S. White Dental Manufacturing Company, Broadway and Thirty-second street.

The president, Dr. William Carr, in the chair.

The following report of the Clinic Committee was presented by Dr. Wm. H. Atkinson, and read by the secretary:

Mr. President and Gentlemen: The clinic this afternoon had an attendance of about seventy-five dentists. The clinical operator,

Dr. J. M. Crowell, through some misunderstanding, did not appear. Dr. E. Parmly Brown, of Flushing, L. I., exhibited some beautiful specimens of all-porcelain bridge-work; they were practical cases, duplicated on models. The work was much admired. Dr. W. Irving Thayer, of Brooklyn, showed his new engine mallet, condensing gold foil with it on the surface of a silver coin. Dr. E. T. Starr, of Philadelphia, exhibited the new "Shaw" dental engine, just introduced by The S. S. White Dental Manufacturing. Co.

On motion of Dr. W. W. Walker, a vote of thanks was given to every person who took an active part in the late anniversary of the society.

President Carr. Gentlemen, Dr. Sudduth, who was to read an essay this evening, is still in Berlin, but he has kindly sent his paper, entitled "On Some of the Pathological Conditions found in Dentine and Ivory," and Dr. Geo. S. Allan will oblige us by reading it.

[Dr. Sudduth's paper will be found under the heading of "Original Communications," in this issue of the DENTAL COSMOS, page 285.—EDITOR.]

#### *Discussion.*

Dr. Atkinson. Mr. President, I rejoice exceedingly that we are considered worthy to listen to investigations of this kind, and I regret that we are not better able to comprehend all the statements made and compare them with well-settled views of our own respecting the metamorphosis that is dealt with in the paper. I am sure that Dr. Sudduth is a good observer in a mass way, but he jumps at conclusions, of which he is convicted by reading between the lines of what he says. He uses the old idea of organic and inorganic like the men who by it have entangled themselves and utterly precluded the possibility of their comprehending what they were talking about. He speaks of the teeth being built up of lime-salts in solution, as if that were anything remarkable. He is innocent of the perception that pabulum, wherever it is, by being introduced into any part of the living mammalian organism—and I don't know but we might go lower than that—will be converted into the kind of tissue that is in need of food. He talked about calco-globine being dissolved by micro-organisms. We have not an acid that will dissolve calco-globine out of its connection with the connective-tissue corpuscles; we have not an acid to-day that will discharge it from Nasmyth's membrane.

He says there are but two specimens of elephants' tusks showing gun-shot wounds. He had better correct his observation. Some men not much older than he is have seen a good many more than that. Professor Wedl has sixteen beautiful specimens in his collection.



Wherever you have perfectly elaborated pabulum, what we call a perfect peptone, it is capable of supplying any of the tissues known to the mammalian organism.

What he means by the bulging of the walls of the elephant's tusk is a little ambiguous. If he means that the pulp-chamber, when looked at from the inner side, is irregular, I can understand it; but if he means when observed from the outside, it is incomprehensible. There is almost always a bulging on the outside; but that does not indicate to us the molecular metamorphosis that takes place in the building of the abnormal form of the tissue; but we could discover it microscopically. Wherever any crystallizable body has exclusive occupancy of space, it will be in the form of a sphere, excepting on the side upon which it rests. These are all spheres sitting in a magma of lime-salts, constituting secondary dentine so-called.

There can be no justice done to the paper or the speaker without an elaboration that is not possible in a short speech.

He says there is no such thing as a reticulum in the enamel. Because he has not seen it, therefore it does not exist! We have men in this room who have seen it; and it is capable of being shown to anyone who has the patience to look at it, and without making any *ad captandum* speech to establish it.

The valuable part of the paper is in its calling our attention to these things. Purchasers of ivory know very well how to distinguish the specimens which have commercial value and the peculiarities which render others undesirable; and these peculiarities are valuable to us as showing the aberration of the nutrient movements. But it is wrong to assume that, because these results of interference or injury appear in the teeth of a long-lived animal, which grow continuously and are devoid of enamel, therefore they must or might appear in the human organism.

These appearances, that enable us to distinguish between a healthy and an unhealthy structure, encourage us to believe that we are coming towards an apprehension of the processes through which these molecular changes are brought about.

The essayist is a physicist; he says that matter is capable of accounting for all things. He does not see that there is something behind matter that operates function. He does not know that the functions of the tree of which he speaks were operated by a power behind matter, coming from the sun and being stored in the cells which constitute the cambium, which is elaborated into the rings or layers seen in such vegetable growths. He seems to think that function means only molecular change. There is a function of knocking a fellow down as well as the machinery by which he is knocked down. But if one tries to find where the ultimate power comes

from it will be beyond his perception. The writer of the paper assumes that matter is capable of accounting for all changes. He talks of the non-vascular structure of the enamel. What sort of definition of the word vascular would he give? He would ignore the protista and the protophyte and the protozoa, and mix up the functions of the annelid and the mollusk and the mammal. The protista, the protophyte, and the protozoa are but stages of development of the three kingdoms. The tubules in the mammalian organism are equivalent to the sap-tubes in trees, through which the solution of the protista or mineral elements is carried for the building up of the stalk of the tree.

It is this misuse of terms that gets us by the ears. It would take three or four nights to properly discuss this paper, after reading it by sections, and show what has been proved, and what has been assumed as possible, and what is impossible in the light of the principles involved. Science is prophecy exemplified. Prophecy is the foretelling of events, and science foretells events.

Men have gone over this ground superficially without attaining a perception of what is to be seen in the field of their observation. This magnificent display that we have had to-night ought to attract the attention of some sufficiently to start the question in their minds of how these changes come about. Did you hear the great mass of nonsense in regard to the why? When a man undertakes to tell why bodies are, he has heavily handicapped himself, because there are so many whys in the serial connection that you cannot get a grip of the final why; the final why is always an assumption. If B. C. Bent, the cornetist, should die, and I could have his body to dissect, I think I could show fractured dentine the parts of which have been brought together and united, and were for years after, living and nourished in a normal and healthy condition. We do not understand all the molecular changes which take place in what we call the elements as they are wrought into various bodies capable of being perceived by our senses. We must have protoplasm to start with. There must be four elements or grades of atoms to make the lowest form of protoplasm, which is  $\text{CHNO}$ ; and as new elements are added we get higher orders of protoplasm, by adding sulphur, phosphorus, iron, calcium, magnesium, and other metals.

He said it was a nucleus in the odontoblasts that made the calcareous wall. Then he said that inside of the nucleus there was a nucleolus that was still more active than the other, and was more easily stained; that when you attempted to stain the nucleolus you stained it more readily than the nucleus. If the nucleus does the work, how could the nucleolus be produced? The on-coming energy is received in the nucleolus, and the elaboration of the formation

starts at that point. He said areolar substance. Trace it back and you find that it has the same meaning as nucleus and nucleolus. What is its significance? The significance of the white connective-tissue corpuscle that fills the trabeculæ of the areolar tissue is limitation, so as to constitute the sheaths and fasciculæ of nerve-tissue and muscle-tissue. The hyperoxide of carbon makes the outer pellicle of all these little soft bodies that are only foresteps in the formation of the tissues. Protoplasm is the first tissue, as it is the last. Function is anterior to molecule, granule, nucleolus, nucleus, and cell.

Dr. Abbott. Would that be considered an inflammatory process in the tusk which was penetrated by the gun-ball?

Dr. Atkinson. I do not understand that we have arrived at what we call inflammation. Inflammation means swelling and pain. Wherever you have an arrest of the nutrient current you get retrogressive metamorphosis towards the embryonic condition, until you get a protoplasmic mass, before it can be organized or reorganized into the tissue involved.

They speak of giant-cells, odontoblasts, osteoblasts, osteoclasts, and I don't know what all, and they do not give you any definition by which you can discriminate them under the microscope. All these are only embryonal corpuscles under various circumstances and situations, and perform the function attributed to them, or result from the disturbances of the function involved.

It is a clear assumption without proof that there was pus in that cavity.

Dr. Abbott. Was this embryonic tissue?

Dr. Atkinson. Undoubtedly. It is the process of reproducing it from the molluscan kingdom, dominated by crystallization, cellulation, and corpusculatation, according to the typical demand. They do not go back to the protista, as they should, to enable them to discriminate the mode of action that produces aberrant or abnormal structure. When you get the special equivalent of lime-salts that is exemplified in calco-globine you are sure that you have animal structure. During this deposit it is obscured to our sight, and the history only enables us to arrive at a rational conclusion other than to ask ourselves how it compares with what we know occurs in the various stages of development.

They say there is a dissolution of lime-salts of the dentine, and that absorption takes place; but who has shown the absorption of the pulp other than by conversion into a carneous body? There is something entirely behind that which produces this return to the embryonic condition; it is an unseen impact. I say it is the on-coming of the radiance that is stored in certain degrees and constitutes



either crystallization, cellulation, or corpusculation. All these have to go back and be melted before they can be absorbed.

The difficulty is in our defective classification. We go over a great deal of ground, and we have very little grain that is digestible when we get through. It needs much sifting, and how can we sift without a sieve? You will have the sieve when you get a classification that is comprehensible. We see a sign, and we ask how did that sign come there; and we go back and back everlastingly searching for the cause and never finding it. We know antecedents and sequents, and that is about all we do know.

Dr. Frank Abbott. Mr. President, this is a very interesting subject, although we have been over the field so many times, and very much in the same way, so that it seems to a certain extent an old matter. I noticed the statement in the paper just read that the enamel and dentine are "fixed tissues," although it was somewhat modified afterwards. If that be the case, how is it possible that inflammation or a reparative process can go on after injury, as shown in these pieces of tusk. The elephant's tusk and dentine of the human tooth cannot be distinguished from one another under the microscope. The question was asked, "Where is the source of life of the enamel, and how is it nourished?" If anyone will carefully examine a fine specimen under the microscope, with a power of 500 to 800 diameters, I think he will have no difficulty in determining that, if there is living tissue in the dentine, that living tissue extends into the enamel; and if there is any nourishment of the dentine, there must be, from the same source, nourishment of the enamel. I have tried on many occasions to show what is called by the different appellations of "the zone of consolidation, protection, or resistance," under a filling, or between the decayed part of a tooth (which is usually removed before filling) and the pulp; and I think I have shown very plainly that there is not consolidation going on, but that a displacement of the lime-salts has taken place in consequence of the melting down of the organic portion of the tissue. This often appears under the microscope like a consolidation, but if the specimen is studiously looked over it will be seen that this appearance is a modified condition of the thoroughly decalcified (decayed) portion of dentine.

Experiments have been made in this country which show that in the process of decay in the deeper portions of a tooth there is no loss of lime-salts, and yet it was said over and over again in the paper that we have heard read to-night that in the process of caries the lime-salts were dissolved out, and that when they were so dissolved micro-organisms entered, etc.

In one part of the paper it is claimed that there is no living tissue

in dentine, and in another part that there is. The writer of this paper claimed a year ago that there was no such thing as organic tissue in the enamel. Kindly listen to what he said then, in an article read before this society at its seventeenth anniversary :

"That Drs. Heitzmann and Abbott hold the theory that inflammatory processes depend upon a large per cent. of organic tissue is evidenced by the fact that they have tried to formulate a theory of development that will fit such preconceived ideas of decay. They have entered through the wrong door. They should have built their teeth first, and afterwards torn them down.

"A man once started on a wrong theory naturally seeks to bend every appearance in support of the position he has taken and prove its correctness. Thus it is that so many erroneous conclusions are reached by those who reason from preconceived ideas. Dr. Abbott claims that he has seen a *fine* network of reticular substance left after decalcifying enamel. Now, I have tried faithfully to preserve and demonstrate this 'reticulum.' I have taken teeth fresh from the mouth and put them directly into Müller's fluid, handling them with as much care as I would nerve-tissues. After several days I ground sections, not allowing the tooth to dry. After grinding I placed them in alcohol to remove the acid, and then stained them by the best technique known. I failed to discover any 'reticulum.' Again, I have taken sections thus prepared and decalcified them under a cover-glass on a slide on the stage of a microscope, carefully watching the process from time to time. *Results negative.* The fluid used was one-half of one per cent. solution chromic acid.

"Again, to avoid all possibility of error in technique, I imbedded sections of freshly-ground teeth in celloidin, and decalcified them in a one-half of one per cent. solution of chromic acid, stained and afterwards examined them with a Zeiss one-twelfth hom. oil im. lens, without being able to demonstrate any organic tissue. By the last-named process it was not possible for the reticulum to disappear through faulty technique. The celloidin, acting as a perfect imbedding mass, was not affected by the acid in the least degree; nor did it hinder in the process of staining, for it is well known that it is more permeable to stains than tissue itself. Further, previous to decalcifying the section, I placed it on a slide, and drew on the reverse side of the slide, with a writing-diamond, the outline of the section. This I used to compare the former outline of the enamel with, by placing the section on it to study. I could thus tell exactly where the reticulum should appear. I did not allow the enamel to be entirely eroded by the acid. The line of demarkation where the decalcifying process stopped was well defined, and no appearance of organized or reticular tissue was to be seen between that portion of the enamel and the

line drawn on the back of the slide which marked the periphery of the enamel before decalcification. On the strength of these and numerous other experiments, made in decalcifying enamel, both in mature and developing enamel, I deny the existence of such a reticular substance."

In the paper read here to-night the statement is made that the enamel when decalcified thoroughly does present a very little organic tissue; but he still claims that there is no living matter in it. So it seems that Dr. Sudduth is learning something in Germany. It is quite probable that at the end of another six months he will show a still further advancement in his education in this direction. He may concede that the dentine and even the enamel are living tissues. It has evidently been a severe struggle to reach the point of conceding that enamel is endowed with any organic tissue whatever, but this much has been done. Now let us take courage in the hope that Dr. Sudduth as well as all others seeking the truth may find it.

Dr. Allan. Mr. President, I do not think anyone appreciates his position here to-night more keenly than I do. To present this paper before you in such a way that you would grasp the idea intended to be presented by Dr. Sudduth, is not an easy matter. As Dr. Atkinson says, these specimens ought to be studied, and I would add that only by a careful study of them will a proper apprehension of Dr. Sudduth's thought be obtained.

With all due respect for Drs. Atkinson and Abbott, I must say that neither of them—and so I fear very few of the rest of you—has comprehended the fundamental idea which Dr. Sudduth intended to convey. Dr. Atkinson has beat all around the bush, but has not said a single thing about the paper. With your kind permission, in as few words as possible, I will endeavor to give you the meaning of the paper as I see it.

The claim made by Dr. Sudduth is this: Neither the dentine in man nor the ivory in the tusk of the elephant—similar structures—can be the seat of an inflammatory action; much less can such an action originate in the body of either. Theoretically he proves this position by drawing your attention to the fact that these tissues are outside of the nutrient circuit, and therefore on physiological grounds could not be the seat of such an action. Then he gives a demonstration of the same conclusion by these beautiful specimens of pathological ivory, and shows how the abscess cavities and masses of abnormal dentine were formed, from whence they started, and how they had their growth, not in the substance of the ivory as seems apparent, but from the odontoblasts lining the pulp-chamber; otherwise there can be no inflammatory action. In illustration, he tells you that the tusk of the elephant belongs to the class of teeth that grow con-



tinuously; that it starts, as it were, with a small apex and with thin walls, and as it grows and pushes out there is a continual deposit of new matter, new dentine, from the pulp on the inside, and that this dentine is deposited centripetally,—that is, from the circumference towards the centre; and furthermore, that it is deposited at regular intervals, as though there were periods of active deposit followed by intervals of cessation, and then by a return of the active deposition of the lime-salts forming the dentine, so that a transverse section of the elephant's tusk would show rings of development, as you see them in trees when cut across the grain. In the common oak-tree you see a well-defined ring which marks each year of growth, and so you can tell about the age of the tree by the number of rings of growth found in its trunk.

Now, if the growing tusk of an elephant is injured by a rifle-ball, for instance, and the force of impact is not sufficient to carry the ball to the pulp-cavity, no harm follows; but if it penetrates to the pulp-cavity inflammation sets in; a new formation of a pathological character is developed and continues for a greater or less length of time. The result may be a pus-cavity, or it may be a mass of pathological dentine. When this diseased action ceases, normal dentine is again deposited by the odontoblasts, and covers the cavity or the mass of pathological dentine, as the case may be.

In case No. 4 (see Fig. 4) a gun-ball, we take it, penetrated to the pulp-chamber before the inner layer had been formed and impinged upon the pulp. New or secondary dentine was formed as a result of the presence of the ball—a foreign body. Here, you see, there is an encysted mass of pathological dentine; and here there is a deposit of new healthy dentine on the inside of that, so that it is encapsulated; afterwards the formation of normal, healthy dentine went on continuously, with the result that you find a bulging out on the inside of that layer of the tusk. In specimen No. 3 (see Fig. 3) you can see the inner and outer layers, and the pus cavity that was formed by some organic injury. I do not know what it was. In specimen No. 6 (see Fig. 6) the injury was of another character. In some way the growing tusk was cracked,—the crack extending to the layer of odontoblasts,—and the injury was repaired. How? Not as we find it in ordinary surgery, by first intention. Nothing of the kind; but by the action of the odontoblasts secondary, normal, healthy ivory was formed around the crack, and it was inclosed, but not united. The reparative process continuing, the injured part kept moving during the process of repair, and the crack extends down into the secondary dentine. Finally the reparative process gets the advantage, and the whole crack is covered up.

In this specimen, No. 7 (see Fig. 7), here is the site where the

ball or spear-head penetrated; on the opposite side of that is the normal dentine encapsulating, as it were, these nodules of secondary dentine; showing the nature of the reparative process.

In regard to Dr. Sudduth's views about living matter in dental tissues—enamel especially—Dr. Sudduth has not changed his views one particle. To-day he holds the same thought he did one year ago, viz., that such a thing as a reticulum of living protoplasm does not exist in dentine or enamel and cannot be demonstrated. Dr. Sudduth never claimed that there was no organic material in enamel; but he does not find living protoplasm there, nor has the organic matter in enamel, such as it is, any connection with the circulatory system; it is not in a way to receive pabulum or to grow. Inflammatory action depends upon growth, just as any normal activity does. You cannot have pathological growth any more than you can have normal growth, unless the part is connected with the living matter of the body. Dr. Sudduth claims that the organic material which chemical analysis shows exists in enamel is not living protoplasm, but dead animal matter. To all intents and purposes the enamel-cap is a coat of mail. It has no other function.

Dr. Atkinson. Mr. President, I think he needs a little help. He says the dentine is deposited by centripetal action, and he says this coagulum has formed after that secondary dentine was. That is the reverse of the truth. All these bodies come, as he says, from the walls. Do we know that? Do I know that encapsulation is there? I almost dare to say I know the cause of that. It was a disturbance in the odontoblastic layer by reason of the impact of the ball that pushed down the layer disturbed, and it is several separate odontoblasts fused into one that makes these lumps.

He says the blood must nourish a live tissue, but he did not tell us that it was the pabulum in the blood that did the work. How does pabulum operate? In forming the elements of the tissues into corpuscles every time. After that you can get dentine by a further deposit of lime-salts.

My great objection to the view of Drs. Sudduth and Allan is that they say decalcification when they mean a melting of the lime-salts. Is it actually taken away because it is melted? By no means. You have the same equivalent of lime-salts in the corpuscles after it has been reduced from its consolidated state.

The special mission of the odontoblasts is to make a secretion of lime-salts for the forming of dentine. If there was just exactly the definite amount of water to serve as the water of crystallization, you might get solid calcified odontoblasts; if not, you would have encapsulated water inside of it, as we sometimes find in geological specimens of rock crystals.

We do not study with sufficient earnestness to fully comprehend them; we should study them carefully, and above all truthfully, and not jump at conclusions. We have to learn that nutrition always takes place in fluid or semi-fluid substances; it never takes place in Beale's "formed tissue." The author of the paper said that the only living tissue was in the nucleus and the nucleolus; that formed tissue was dead. If we wish to know the difference between the various stages of tissues we must look upon life as manifested in a seven fold measure. The first that is cognizable as separate and individual will be atomic life. Combinations of atoms will produce molecular life; accretions of these in regular order produce cellular or corpuscular life; next tissual life; then organic, systemic, and conscious life; all of which degrees must be discriminated to enable us to legitimately name the living and the dead tissues of the bodies that we have under examination.

Adjourned.

B. C. NASH, D.D.S., *Secretary*.

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### ODONTOLOGICAL SOCIETY OF PENNSYLVANIA.

THE regular meeting of the Odontological Society of Pennsylvania was held Saturday evening, January 8, 1887, at the office of Dr. Thomas, 912 Walnut street, Philadelphia, President Register in the chair.

The following paper was read by Chas. J. Essig, M.D., D.D.S., upon

#### CROWN AND BRIDGE-WORK AND CONSERVATIVE DENTISTRY.

As the time seems to have arrived when the different plans of setting artificial teeth (properly coming under the head of bridge-work) have assumed a fixed and distinct place in prosthetic dentistry, it will be well for those who, attracted by its apparent advantages, are ready to accord it preference to the ordinary removable denture, to give the most thorough consideration to the fitness of each in meeting the requirements of particular cases. To decide such questions correctly is not always easy, and a careful operator will only make his decision after a thorough examination of the case in hand. He will examine the natural teeth to which his bridge-work must be anchored; he will note whether these are devitalized or not, for that important fact should have much to do in influencing him in the adoption of a plan.

He will next investigate the relative merits of the different methods of bridge-work and the ordinary denture; he will make a sort of mental analysis of each, as to their general influence on the comfort of the patient, their comparative cleanliness, and above all the



question of possible injury to the remaining natural teeth; he will not attempt to decide until, after making a thorough examination of the mouth, he has obtained an accurate impression, which he can study with reference to all the points involved.

In the present status of bridge-work there seems to be a greater desire to originate than to conserve, and some of the methods described in the journals are not only impracticable, but quite ruinous to the sound, natural teeth to which the fixtures are often attached. Take, for example, the method, "Pin and Plate Bridge," described in the DENTAL COSMOS for March, 1886, wherein the writer describes "a typical case," in which a lateral incisor (crown and root) has been lost, the cuspid and front incisor, fully vitalized, and without approximal carious cavities, remaining in position. To meet this loss he prepares a porcelain lateral tooth, to the backings of which are two pure gold wings, swaged to fit the palato-approximal surfaces of the cuspid and incisor, and attaches this appliance to the cuspid and central incisor by platinum rivets, attached to the wings or palato-approximal base plates, and fitting into small cylindrical openings drilled into these previously sound teeth, and fastened there by means of oxyphosphate of zinc.

Strength and impermeability are indispensable requirements in any method. Whether pure gold plate of No. 26 and oxyphosphate cement fastenings offer a reasonable promise of withstanding the great and constant force exerted upon such a fixture may, I think, easily be determined without a trial. Upon the strength of the fixture depends its immobility and consequently its permanence. If the bridge is not absolutely immovable, it will not be impermeable, and in the absence of that characteristic destruction of the teeth to which the pins are fastened must soon follow. Such examples of so-called bridge-work look well on paper, but let us make a careful comparison of the "typical case" above mentioned and the ordinary method of replacing the lost tooth by the removable partial gold plate, which it is intended to supersede.

What are the great objections to the usual form of artificial dentures? They are three in number:

1. The presence of a plate covering the roof of the mouth.
2. A certain amount of instability, which depends, however, upon the skill displayed in the construction of the fixture.
3. The necessity which often arises of attaching the partial denture to the natural organs.

Let us admit at once that clasps are more or less injurious to the natural teeth; but is the kind of bridge-work described in the above number of the DENTAL COSMOS less so? Is it not reasonable to assume that the friction due to the slight motion of the removable plate,

together with the facility with which it can be removed and thoroughly cleaned, will, in a measure, protect the natural teeth to a greater extent than where the clasp or fastening is not removable, but just as permeable? Of course the answer to this question must depend upon the stability of the bridge, but we have no right to experiment upon the natural organs of our patients when such experiments may involve their loss; nor do I deem such uncertain work necessary in the hands of experienced dentists. Such members of the profession will look the question squarely in the face, and recognize at once that all attempts to anchor bridge-work to vital teeth are objectionable, and not usually attended with good results.

In the article to which I have alluded is also described a case of bridge-work for the replacement of two molars and one bicuspid, by fastening to the first bicuspid and the third molar, by means of crown plates or caps swaged of gold. It will be noticed particularly in the case of the first bicuspid, that "the crown plate" or partial cap is so constructed that every part of the tooth is covered except its buccal surface, thus offering an extensive margin for the ingress of fluids. That such a fixture, depending upon the very superficial anchorage afforded by openings made in vital teeth, can be exposed to the tremendous force exerted in masticating without loosening and displacement, seems hardly possible, and that the partial cap described there as a means of embracing the first bicuspid will remain close enough to exclude moisture I do not for a moment believe.

The employment of such means of attachment to vital teeth I deem most censurable. I do not wish to be understood as expressing disapprobation of all kinds of bridge-work, but I do condemn all procedures of the kind where the operator drills into or mutilates vital teeth for the purpose of forming anchorages; because that is not conservative dentistry.

The application of bridge-work to pulpless teeth certainly offers more encouraging prospects of permanence, and is in every way less objectionable.

The abuse of the method, when fastening to devitalized teeth, will be likely to consist in the hopeless attempt to make three or four roots sustain the masticating force of an entire upper or lower denture of fourteen teeth; but even in such badly directed application of the bridge method the harm will be most likely to fall upon the patient's purse, and may not inflict irreparable injury to valuable teeth. Still, there are many instances in which the immobile fixture will be found to be in every respect superior to the removable plate; but the prospective permanence of the fixture is the feature which should decide the question. When we carefully consider the relative permanence of the different methods of attaching artificial teeth, we find ourselves restricted to very narrow limits.

The same writer from whom I have quoted makes the statement that "experience has fully demonstrated that a slight mutilation of a vital tooth is far less destructive in its ultimate results than is the wearing of partial plates."

I have met with no such conclusive evidence in favor of mutilation, nor do I believe that the method has been sufficiently tested by time and the forces to which its function must subject it to warrant the belief that it should supersede in all cases the removable artificial denture. Though this method of attaching artificial teeth has not until quite recently been employed, it is claimed that immobility and permanence have been amply secured.

I have noticed that the apprehension of the idea of permanence in connection with this subject differs widely in different minds; but it is not unreasonable to expect the durability of bridge-work to be at least equal, if not superior, to the old and tried method which it is designed to supersede. I have seen many partial dentures which had been worn with comfort and safety to the remaining vital teeth for periods varying from fifteen to thirty years. How many examples of such bridge-work in connection with mutilated vital teeth will last that long?

In the description of "The Pin and Plate Bridge" from which I have quoted it is admitted, even this early in the history of the method, that a very few cases have become loosened, the bridge being for some weeks still worn in the loosened condition, and that under such circumstances the cement will, of course, become detached and wash out, admitting food and secretions.

It is hard to conceive of a worse result, and in the majority of such cases rapid decalcification of the enamel under the loosened plate would be sure to follow.

A young professional friend recently described to me a case in which a very nicely adjusted gold cap, covering the palatal surfaces and cutting edges of the four central incisors for the purpose of retaining them in position, resulted in three weeks in serious decalcification of the enamel.

Placing systematically the different methods of attaching bridge-work to the natural organs with reference to their probable permanence and capacity for usefulness, that plan in which the anchorage consists exclusively in the cap or ferrule, in connection with the pin or dowel, adjusted to devitalized roots, will be regarded as ranking highest in all the qualities which care and judgment should demand for such a fixture.

It is the so-called Richmond crown, either singly or in numbers united, so as to constitute a bridge, and where each tooth is fastened to a sound root. The superiority of this method over all others does



not alone consist in the impermeability which is afforded by the cap or ferrule, but in the fact that it also removes strain from the long axis of the tooth to the alveolar socket, where it properly belongs; and this prevents the very common occurrence of fracture of the roots.

Conservative dentistry has made no more important advancement than this in the last ten years. It enables the dentist of to-day to save and utilize roots of dead teeth that but a short period before were removed by thousands.

But even this form of immobile denture is open to one serious objection—namely, the difficulty of replacing a broken tooth. No reliable method of replacing teeth, which are liable to give way in time, has as yet been devised.

An attempt to utilize the screw and nut in bridge-work cannot fail to be regarded as retrogressive.

To meet this objection movable fixtures have been recommended. One of these is described in the "Hints and Queries" of the DENTAL COSMOS for September, 1886; but as the security of the fixture depends upon attachments to the natural teeth by means of several gold screws, it is in no respect an improvement over the ordinary artificial denture, and its employment would be much more destructive to the vital organs to which it is proposed to attach it.

The abuse of the immobile fixture already alluded to, wherein two roots are frequently made to sustain the masticating force of six or more teeth, has done much towards bringing bridge-work into disrepute. That such unequal distribution of force can afford a reasonable promise of permanence is not probable, unless the wearer of the fixture is fully informed of its deficiency and exercises unremitting care; but under those conditions it could not be claimed that such a specimen of bridge-work was fully useful.

Something should also be said about the materials employed in fastening crowns either singly or in numbers united.

There are four materials more or less extensively employed for this purpose. They are oxyphosphate of zinc, oxychloride of zinc, amalgam, and gutta-percha.

The first seems to possess about all that is required of such an agent. It may be used successfully in fastening crowns to defective roots where the oxychloride would afford nothing but failure. I refer to those cases where, either by the careless use of the drill in enlarging the canals for the reception of the pin or by decay, the side of the root is perforated. The oxychloride in such cases will be found to be so irritating to the tissues that violent inflammation will soon follow the introduction of the crown,—indeed the escharotic properties of the chloride of zinc, even in sound roots, may cause

sloughing of the margins of the gum to an extent sufficient to impair the operation. In addition to this, there is scarcely a question that the phosphate is less soluble than the chloride cements. Amalgam and gutta-percha are both inferior to oxyphosphate of zinc for crown and bridge fastening, because they cannot be used with facility with the cap or ferrule; and in the case of amalgam, I have noticed in many instances, where it has been employed as a fastening for crowns, an unusual amount of irritation of the free margin of the gum. In many such examples this is likely to be due to imperfect workmanship; but there is also probably some action of the secretion of the gum at the point of union of the crown and root, on the amalgam, by which its surface is roughened by partial solution, and thus made irritating. But, be this as it may, I have seen such extraordinary examples of tumidity, persistent bleeding, and general discomfort following the use of amalgam in setting crowns that I do not hesitate to give it a very low place as a fastening material.

Of gutta-percha it is needless to speak at length, as the improvement in crown and bridge-work of the last few years has rendered its use for the purpose almost obsolete. Either of the materials named may fail to afford perfect stability when not properly used. Durability will depend greatly upon the plan of construction of the crown or bridge; but when employed in connection with the cap fitting accurately the end of the root, together with a stout pin of platinum gold extending into the enlarged nerve-canals, more than the necessary amount of strength and durability will be attained.

It is due to Dr. Bonwill to state that he has suggested a means by which his crown can be set so as not only to obviate the objection which may exist against amalgam as a means of fastening, but also to make the Bonwill crown include some of the advantages embraced in the so-called Richmond crown. This consists in making a ring to accurately fit the end of the root and part of the crown, so that the root is strengthened and the gum protected from contact with the amalgam.

From long personal experience with the use of the ring as a means of binding together the parts of a fractured root, as well as a reinforcement to a sound root, I am able to commend it as one of the most useful devices which the dentist can employ in the class of cases under discussion.

Dr. C. S. W. Baldwin, in the DENTAL COSMOS for January, 1887, suggests a very valuable device in the form of a cap covering the end of the root, by which the Logan crown is brought very near the highest standard of crown work; but both the Bonwill and the Logan methods are deficient in that two or more of them cannot be united to form a bridge; they must be employed as individual crowns

or pivot teeth ; while in the so-called Richmond crowns the backings of two or even more may be united by soldering, so that the strength which union affords is easily attainable, and the strong cuspid root may often be made to support a weaker lateral root. Where two or more roots adjoin each other the crowns should always be united. My friend Bonwill will say that this only adds to the difficulties should one of the teeth of the fixture break. Of course it does. The difficulty of repairing bridge-work constitutes the greatest objection to it, while the ease with which the crown bearing his name may be replaced in case of accident is by far the most valuable feature of his method. None of them are as yet perfect, but the Richmond crown comes nearer to the requirements than any other.

When a root splits under the strain against its long axis, to which it is more or less exposed in mastication in ordinary pivot cases without the ring or cap, there begins at once a tendency of the fractured parts to separate, and the resulting space is filled up by a proliferation of the gum-tissue. A few years ago such cases were looked upon as hopeless, and were usually superseded by the artificial denture ; but now even such roots may be restored to almost perfect usefulness by the employment of an accurately adjusted ring of gold or platinum, by which means the juxtaposition of the pieces is restored and securely maintained.

The crown, singly or in numbers united to form a bridge, when properly planned and constructed with reference to strength and impermeability, and applied exclusively to devitalized roots, represents the highest achievement of conservative dentistry, and it settles the vexed question as to whether operative and mechanical dentistry should be separately taught and practiced ; for while crown and bridge-work begins where operative dentistry stops, it cannot be relegated to either branch exclusively, because it demands in its successful accomplishment the experience and skill of both.

#### *Discussion.*

Dr. James Truman. There are one or two points, I think, of importance in this connection. Dr. Essig acknowledges that a band cannot be placed around a tooth without decalcification taking place. If this be correct, why shouldn't the same result follow by the use of a cap over a root ? It seems to me they occupy similar relations to the oral secretions. My own judgment is that a band in either place is not analogous to a clasp. The former, whether around a tooth or root, is rendered harmless by the cement placed between it and the tissue.

The most serious objection to my mind is that of the irritating effect of the band on the pericementum. If this be forced up on the



root, it must to the extent of the pressure produce irritation and death of the membrane.

Again, are systemic conditions taken sufficiently into consideration? Many of these will necessarily antagonize the success of the operation, but are probably rarely considered.

Dr. A. G. Bennett. It may be said in general that bridge-work has not been in use long enough to develop much skill, or to enable us to come to any definite conclusion respecting its merits or demerits. Most critics assume that all defects are inherent in the system. Most failures are due to want of care and skill in the dentist. There are many false notions in regard to the caps and bands. The Richmond crown is the best, because by closely banding the root it prevents splitting and re-decay.

The shape of the process determines the shape of the upper border of the band. But, after all, the most important thing in fitting the band is scaling the enamel so that the sides of the root are parallel. Scaling the enamel off the root is as necessary to fitting the bands closely as a perfectly prepared cavity is to a perfect filling. Many bands are driven up too high. They need not be more than one-sixteenth of an inch wide.

A closely fitted and finely finished band is not so liable to irritate the gum as a metallic approximal filling, since the band is perfect as to finish before being placed in position.

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#### CHICAGO DENTAL SOCIETY.

At the annual meeting of the Chicago Dental Society, held Tuesday evening, April 5, 1887, the following officers were elected for the ensuing year:

J. G. Reid, president; J. A. Swasey, first vice-president; G. H. Bentley, second vice-president; C. N. Johnson, recording secretary; W. B. Ames, corresponding secretary; E. D. Swain, treasurer; A. W. Harlan, librarian; G. H. Cushing, E. Noyes, and J. A. Swasey, board of directors; B. L. Rhein, J. W. Wassall, and L. L. Davis, board of censors.

W. B. AMES, *Cor. Secretary*,  
516 Pullman Building, Chicago, Ill.

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#### VERMONT STATE DENTAL SOCIETY.

At the eleventh annual meeting of the Vermont State Dental Society, held at Burlington, March 16-18, 1887, the following officers were elected for the ensuing year: E. E. McGovern, president; W. H. Spencer, first vice-president; G. W. Hoffman, second vice-president; Thos. Mound, secretary; W. H. Munsell, treasurer;

W. S. Curtis, F. M. Schell, and Geo. F. Cheney, executive committee.

The next meeting will be held at St. Johnsbury, commencing on the third Wednesday in March, 1888.

T. MOUND, *Secretary*, Rutland, Vt.

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#### AMERICAN ACADEMY OF DENTAL SURGERY OF NEW JERSEY.

THE annual meeting of the American Academy of Dental Surgery of New Jersey was held at the residence of Dr. C. A. Meeker, Newark, N. J., April 4, 1887.

The following officers were elected for the ensuing year: W. W. Walker, president; Fred. A. Levy, vice-president; Charles A. Meeker, secretary; A. R. Eaton, treasurer; James G. Palmer, curator; Fred. C. Barlow, William P. Richards, Worthington Pinney, C. A. Timme, and G. Carleton Brown, board of examiners.

CHAS. A. MEEKER, *Secretary*, Newark, N. J.

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#### SOUTHERN DAKOTA DENTAL SOCIETY.

THE Southern Dakota Dental Society will hold its next meeting at Watertown, Tuesday, June 7, 1887.

A. L. SMITH, *Secretary*,  
Sioux Falls, Dakota.

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#### DENTAL SOCIETY OF THE STATE OF NEW YORK.

THE Dental Society of the State of New York will hold its nineteenth annual meeting at Albany, May 11 and 12, 1887.

The Board of Censors will meet at the same place, May 10.

J. EDW'D LINE, *Secretary*,  
No. 26 East Main street, Rochester, N. Y.

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#### MASSACHUSETTS DENTAL SOCIETY.

THE semi-annual meeting of the Massachusetts Dental Society will be held at the Hawthorne Rooms, No. 2 Park street, Boston, Mass., on Thursday and Friday, June 9 and 10, 1887.

It is expected that this will be one of the most instructive meetings ever held by the society. Papers and clinics of particular interest are already assured.

GEORGE F. EAMES, *Secretary*,  
No. 62 Trinity Terrace, Boston, Mass.

### MISSOURI STATE DENTAL ASSOCIATION.

THE twenty-third annual meeting of the Missouri State Dental Association will be held at Kansas City, Mo., commencing on the third Tuesday in June, 1887, and continuing its sessions for four days—June 21 to 24 inclusive.

An interesting programme and a large attendance may be expected.

JOHN G. HARPER, D.D.S., *Rec. Secretary*,  
No. 516 Walnut street, St. Louis, Mo.

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### KENTUCKY STATE DENTAL ASSOCIATION.

THE Kentucky State Dental Association will hold its seventeenth annual meeting at the Louisville College of Dentistry, Chestnut street between Floyd and Preston, Louisville, Ky., beginning Tuesday, June 7, 1887, the sessions continuing three days.

The State Board of Examiners will meet daily during the sessions to register and examine applicants.

Members of the dental profession at large are cordially invited to attend. Reduced rates have been arranged for at the hotels.

CHARLES E. DUNN, D.D.S., *Secretary*,  
No 529 Second street, Louisville, Ky.

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### SUSQUEHANNA DENTAL ASSOCIATION.

THE Susquehanna Dental Association will hold its twenty-third annual meeting at the Cameron House, Lewisburg, Pa., on the 11th and 12th of May, 1887; opening on Wednesday, at 10 o'clock A. M. Hotel accommodations, \$2.00 per day.

A very cordial invitation is extended to the profession generally to attend. The meeting will be favored with a number of interesting addresses, papers, and clinics.

H. GERHART, *Chairman Ex. Committee*,  
Lewisburg, Pa.

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### GEORGIA STATE DENTAL SOCIETY.

THE nineteenth annual meeting of the Georgia State Dental Society will be held at Cumberland Island, Ga., May 24 to 28, 1887.

The State Dental Examining Board will meet at Brunswick, Ga., on Monday, May 23, at 10 A. M., for the examination of all applicants for license to practice dentistry in Georgia. Since October 9, 1885, it is a "misdemeanor" to commence practice in said State without a license from the board. There is no exception to this rule.

L. D. CARPENTER, *Secretary*,  
Atlanta, Ga.



## NEBRASKA STATE DENTAL SOCIETY.

THE annual meeting of the Nebraska State Dental Society will be held at Hastings, Neb., commencing on Tuesday, May 17, 1887.

An invitation is extended to dentists throughout the State to be present and assist the society.

I. W. FUNCK, *Secretary*, Beatrice, Neb.

## NORTH CAROLINA STATE DENTAL ASSOCIATION.

THE thirteenth annual meeting of the North Carolina State Dental Association will be held at Morehead City, commencing June 7, 1887, the sessions continuing for three days.

All dentists and gentlemen interested in the profession are cordially invited to attend.

The Board of State Dental Examiners will hold its annual meeting at the above time and place.

THOMAS M. HUNTER, *Secretary*,  
Fayetteville, N. C.

## CHICAGO COLLEGE OF DENTAL SURGERY.

THE fifth annual commencement of the Chicago College of Dental Surgery was held at the Grand Opera House, Monday, March 28, 1887, at 2.30 P. M.

The valedictory was delivered by James R. Pagin, D.D.S., and the faculty address by Prof. A. W. Harlan, M.D., D.D.S.

The degree of D.D.S. was conferred on the following graduates by Dr. J. A. Swasey, president of the college:

NAME.	RESIDENCE.	NAME.	RESIDENCE.
Dewitt Clinton Bacon.....	Illinois.	Arthur Nelson.....	Missouri.
Henry Cliff Ballard.....	Minnesota.	M. Eugene Norton.....	Illinois.
Charles Edwin Bentley.....	Wisconsin.	Henry O'Brien.....	Illinois.
T. Albert Broadbent, B.S.....	Illinois.	James Richard Pagin.....	Indiana
Chas. Dibble Calkins, M.D.....	Illinois.	Harry Norris Pitt .....	Illinois.
Charles Wilkins Coltrin.....	Illinois.	John Henry Reed.....	Wisconsin.
Walter Scott Conn.....	Illinois.	Chas. Christian Rosenkranz	Illinois.
William Henry Damon.....	Illinois.	Otto Eberhardt Seeglitz.....	Illinois.
Ernest Edward Davis.....	Michigan.	Frank Garner Stover.....	Illinois.
Charles Perry Deming.....	Wisconsin.	Chester James Underwood..	Illinois
Frank Armstrong Dodge.....	New York.	Harry Elmer Wade.....	Illinois.
Joseph Henry Goodearle.....	Wisconsin.	Henry Palmer Wadsworth..	Illinois.
Edmund Jerome Hart .....	Wisconsin.	Julius Albert Waschkuhn...	Illinois.
George William Haskins.....	Illinois.	Frank Charles Wermuth....	Wisconsin.
Luther David Henderson.....	Wisconsin.	George Nelson West.....	Illinois.
James Eucherus Keefe.....	Illinois.	Harry H. Wilson.....	Illinois.
John Liggett.....	Illinois.	William Witt.....	Illinois.
Elgion Mawhinney.....	Dakota Ter.	Frank H. Zinn.....	Wisconsin.
William Evans Morris.....	Illinois.		

## EDITORIAL.

### RECENT DENTAL LAWS.

LAWS governing the practice of dentistry have recently been passed in the several States of Indiana, Massachusetts, Connecticut, Alabama, Arkansas, Nebraska, and Oregon. We will publish the text of these acts in a future number. We had put some of them in type for this issue, but were compelled to lay them over with other matter for want of room.

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### AN OVERSIGHT.

THE illustrated paper by Dr. Alfred Gysi, which appeared in the April DENTAL COSMOS, was the thesis which he presented for the degree of D.D.S. at the late commencement of the Pennsylvania College of Dental Surgery. This fact should have been stated when the paper was printed, but it was omitted by an oversight which we do not wholly regret, as the necessity for explanation gives us the opportunity to congratulate the profession on the scientific attainments of some of the men now entering the ranks, encouraging the hope that increasing competition will result in a steady and general advance of the educational standard.

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### UNIFORM TEXT-BOOKS.

It will be remembered that at the last meeting of the National Association of Dental Faculties steps were taken looking toward the publication of a series of text-books for use in the schools belonging to the association. Prof. Fillebrown, of Harvard, was deputed by the committee on text-books to prepare the work on Operative Dentistry, and Prof. Guilford, of Philadelphia Dental College, that on Orthodontia.

At a meeting of the committee, held March 28, in this city, the gentlemen named presented syllabi of their respective books, which were discussed, and with the suggestions made adopted. The volumes will now be completed, when they will be submitted to a sub-committee, consisting of Profs. Fillebrown, Peirce, Abbott, Darby, Guilford, Dennis, and Kulp; meeting the approval of the committee, they will be published under the sanction of the association.

We are informed that another volume of the series (on Dental Chemistry and Metallurgy) is in preparation under the supervision of Prof. A. O. Hunt.

## BIBLIOGRAPHICAL.

**DENTAL PATHOLOGY AND THERAPEUTICS**, in the form of Questions and Answers. Compiled by OTTO E. INGLIS, D. D. S.; carefully revised and approved by J. FOSTER FLAGG, D. D. S., professor of dental pathology and therapeutics in Philadelphia Dental College. Octavo, pp. 105. Price, cloth, \$3.00.

We have here seven hundred and nineteen questions and answers referring to dental pathology and therapeutics. The queries cover very thoroughly the whole range of dental diseases and their treatment, and the answers thereto are terse, plain, and comprehensive. One can hardly imagine a problem in dental pathology which is not here covered by question and answer. Appended is a list of medicaments used in dental practice, arranged in alphabetical order, with medical properties and methods of employment. A blank page for memoranda faces each printed page. The practitioner must be well informed who would not find frequent occasion for reference to this volume in daily practice, while the student can find no such amount of information in any other volume of its size of which we have knowledge.

**THE MANAGEMENT OF PULPLESS TEETH.** Chicago: 1887.

We have just received a neat pamphlet of thirty-two pages, and copy, as showing the purpose of its publication, the modest and brief preface:

"The Odontological Society of Chicago, realizing the want of some hand-book of reference in relation to the treatment of pulpless teeth that are to remain in the jaws, sends out this monograph with the hope that it may prove of service to the profession. It purposes to detail a simple but comprehensive system of treatment, without attempting to present the various other meritorious methods which have from time to time been advocated."

The topics concerning the proceedings indicated by the title are discussed in ten chapters, and an appendix of six chapter paragraphs treats of broaches, bleaching teeth, antiseptics, disinfectants, etc.

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## HINTS AND QUERIES.

WILL anyone who knows inform us who made the first dental splint?—N.

REPLY to "R.," in the February number of the DENTAL COSMOS: The best plan for placing a first upper bicuspid is by first fitting a gold band, one-eighth or three-sixteenths of an inch wide, closely about the largest portion of the crown of the second bicuspid, after separating it from the molar and trimming to shape. To this band solder a plain cuspid. The band is cemented on and burnished



down. This position of the band allows of perfect cleansing at the gum. The gold should be the 22-carat crown gold, No. 30, of The S. S. White Dental Mfg. Co.—A. H. T.

REPLY to "R., in Hints and Queries of the February number of the DENTAL COSMOS: He can fill the space he speaks of by grinding off the cusps from the second bicuspid, and fitting a nicely adjusted gold crown over it. Then, taking a plain plate cross-pin cuspid tooth, back it with pure gold, No. 30, and cover heavily with 20-carat solder. After finishing the backing down to a fine edge at the cervical portion of the tooth, attach it to the gold crown. The backing should extend to the cutting edge of the tooth, or it will be liable to break in the mouth. I have performed just such an operation, and find it highly satisfactory.—L. N. SEYMOUR, D.D.S., Asbury Park, N. J.

FRACTURE OF SECTIONAL TEETH.—I wish to state to A. A. Hazeltine, of New Bedford, Mass., that my mind has changed since a "year or so ago," and I now think as he does, that the sudden immersion of porcelain teeth in boiling water will not crack them, for I too practice it now with perfect impunity, "and almost never" have a broken block. I think also that he is close to the exact truth when he says "it can be accounted for by haste, too much rubber, and want of care," and, allow me to add, too much muscle in clamping, especially when, as is too often the case, the flasks have become a little out of shape and there is not a nice adaptation of the parts, thus throwing too much pressure on the plaster. I believe many dentists stick to their old, worn-out flasks much longer than they should. To be certain that the two halves of the flask are in contact, they should always be put under the clamp and pressed firmly together when the upper or last half is "poured." It seems to me his method of getting "just enough" rubber would make a great deal of unnecessary work, but probably I am mistaken again. My plan to get "just enough" is to weigh my rubber, unless in lower cases, when I sometimes use weighted rubber, which is seldom. The amount of rubber required is always just double the weight of the base-plate wax which it is to replace.

I warm my case just enough to make the wax pliable before separating, being careful not to melt it. It will then separate easily, and the wax can all be obtained. Put it in one end of a pair of balances, and put an equal weight in the other end; then put your wax in the other end with the weight, and you have double the weight of wax in that cup; then put in rubber till it balances, adding a piece as wide and long as your little finger for surplus if you use waste-gates. Practice this method a short time, and you will be sorry you never did it before. I have been particular in describing the way I weigh it because it is so handy to have a little pair of balances hanging close at hand, while to use an ordinary pair of scales would be much more trouble. In this manner no accurate weights are needed, for it does not matter how much it weighs.

Try painting the cast with a solution of rubber in chloroform, and see how much easier you get along. Of course this would not do if you wish to separate the flasks again, for the solution causes the rubber to adhere to the cast, and makes packing easier.

After packing, follow Dr. Hazeltine's directions to *use as little force as possible from that time till the sections are ready to insert in the mouth.* "Handle with care," and you will be repeatedly made happy by the case coming out as whole as it went in.—R. M. PELTON, Au Sable, Mich.

THE

# DENTAL COSMOS.

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## ORIGINAL COMMUNICATIONS.

### CROWN AND BRIDGE-WORK.

BY A. G. BENNETT, D.D.S., PHILADELPHIA, PA.

(Read before the Odontological Society of Pennsylvania, February 5, 1887.)

DENTISTRY is the science and art of saving and substituting teeth. Saving teeth by filling has been the chief theme of thought and discussion, and has exercised the highest skill in the profession. But since for various reasons, such as inherent defects, extent of disease, lack of ability on the part of the operator and want of care on the part of the patient, large numbers of teeth are lost, prosthesis becomes, and in fact has always been, an important branch of practice.

Until within a few years dentistry consisted chiefly of fillings and plates, neither of which have always met the requirements in every case. During the last decade there has been rapidly developed what may be properly called a third branch of dentistry, closely related to the preceding, which has been practiced with varying degrees of success and failure, and has been advocated and opposed with almost all degrees of knowledge and prejudice. This new system, which is, strictly speaking, an old system revived and greatly improved, is called crown and bridge-work. Though resembling prosthetic dentistry more than operative, this mode of restoring lost organs partakes of the nature of both, and begins where filling ends. Filling by restoring lost tissue attempts to save the crown, while crowning may be said incidentally at least to save the root. If it can be shown that this new system of prosthesis has a scientific basis and conforms to correct mechanical principles, time and practice can be depended on to develop skill in the art of construction. Of the few things we know with certainty about dentistry, one of the first is that any mechanism that ignores the facts of science, or does not comply with conditions and meet requirements, must inevitably fail.

Though I think that this new system of substitution has been well named, yet the term bridge-work is associated in many minds with all that is discreditable to the dentist and disgusting to the patient. While not strictly correct in all cases, this new method might not inaptly be termed *continuous crown-work*—a name that perhaps would weaken some of the opposition and prejudice that bridge-work has encountered; for no one would object to from three to six crowns in one jaw, *provided they were on separate roots*. And yet when a bridge extends across a space *without roots*—a condition that favors health in the parts and cleanliness in the work—objectors protest at once. Much that we hear against bridge-work gives no indication of the would-be “cautious scientific mind” that we read about; so that when we hear some objections against this system called “fatal admissions,” we have no fear that all our bridges will break down under the weight of baseless criticism, or fail to stand the test of time. The most truly scientific mind cannot, from the nature of things, give a final decision in advance against any method of substitution that is so closely allied to crown and plate-work. But though the thoughtful may decline to commit themselves for or against this new system, the unthinking will still insist on saying “I don’t believe in it,” or “I think it is all wrong,”—thereby mixing up the tangible and material with the moral and spiritual.

In regard to the progress of this new system of dentistry, it may be said in general that more is to be feared from the zeal of the blind enthusiast than from the opposition of the most conservative; for, while the latter at the worst may deny the subject a hearing, the former will bring it into discredit through inexperience and want of judgment. But bridge-work within certain limits, which will be indicated later, has such positive merits that, on the one hand, it does not come begging for recognition, nor, on the other, does it need any partisan pleaders or special advocates.

*Crowning.*—Of the two parts of a tooth, the crown and the root, the former is much more exposed to destructive agents, and depends for its preservation chiefly on the skill of the operator; while the latter is comparatively well protected against external causes of disease, and, when pulpless, depends for its integrity on the proper application of germicides and disinfectants, and for its retention on the health of the peridental membrane, which gives vitality to the cementum. At an early day crude attempts were made to utilize the roots of teeth for attaching artificial crowns. For years this branch of dentistry made but little progress, chiefly because dental pathology and therapeutics had not yet shown the true condition of pulpless teeth nor indicated the proper remedies for their treatment. During the last decade, however, crowning has made great progress, until



now it can be truly called one of the most durable and satisfactory operations in modern dentistry.

As already intimated, when from poor structure or worse dentistry a crown must be lost, the operator makes his next stand at the root, where his work not only gives promise of more permanence, but incidentally sets up a more durable barrier against the inroads of decay than is found in many fillings. Such a crown is here referred to as will easily withstand the force of mastication and protect the root from the action of the oral fluids.

Since the most important part of a bridge is a crown, and the basis of this is a band, some details which are perhaps familiar enough are required. Almost all the crowns in use have decided merits, but for several good reasons the band or ferruled crown (Figs. 2 and 3) is the best, especially for the piers and abutments of bridges. The band or collar not only greatly strengthens roots that have been weakened by decay, but *brings the force of mastication against the entire root*, and at the same time most effectually protects its end against the action of the oral secretions.

There are various methods of making what is now known as the Richmond crown, the one most frequently used in bridge-work. Of the various modes of making the band or ferrule, which is the basis of this crown, that of course is the best which saves time, labor, and

FIG. 1.



FIG. 2.



FIG. 3.



pain. The following are the several steps, and, I think, the easiest and quickest methods, in the process of making a Richmond crown. For convenience of description, the cap over the *end of a root* consists of band and base-plate; a cap over a *whole tooth*—a bicuspid or molar—is called a cap-crown:

1. Trim off the tooth to the gum except at the palatal side, where it can be from one-sixteenth to one-eighth of an inch in length. Cut it off with thin-edged corundum-wheels or sharp retaining-point drills, using the excising forceps sparingly.

2. Scale the enamel from the root, thus making its sides parallel (Fig. 1), so that the bands may *fit closely their entire width*. Unless the enamel is scaled at least from the front and sides, even a narrow band will leave the root and pass into the gum.

3. Form the band by annealing and bending a piece of 22-carat gold, 28 or 29 gauge, about the round handle of an excavator, a trifle *smaller* than the root, so that in pressing it up to place the gum is not wounded. If the root is not round, the band may be flattened or otherwise shaped by pressure with the fingers or suitable pliers.

4. Trim the upper border of the band to conform to the shape of the process or the line of the gum-attachment; then carefully bevel and smooth the upper edge, so that the soft tissues are not lacerated or the gum torn from the tooth. Unless the band is greatly depressed laterally, in some cases, the gum will be detached from the tooth at the sides before the root is covered high enough at the front and rear.

5. Place the band thus shaped against the root; spread it out a little with the end of the finger, and press it up to where the soft tissues are attached to the tooth, which is shown by the slight whitening of the gum under pressure.

6. Let the band lap at the palatal side, and, making sure that it is close all around, remove it from the root with soldering pliers; then make it a little smaller, so that when it is soldered it must be gently driven into place.

7. Trim the lower border of the band, so that when the cap is completed it will have two slopes from about the centre—one to the front, the other to the palatal side (Fig. 3).

8. The base-plate is more easily and quickly soldered on, not by fitting it *inside* but *against* the end of the band. Press the annealed base-plate against the cap with the fingers, and hold it in place until soldered with one or two strands of thin wire.

9. The canal should be enlarged towards the palatal side of the root, thus giving more room to grind on the tooth when the pin is in place with its lower end bent away, and securing at the same time the greatest attainable strength when the crown is completed.

10. File the labial slope of the base-plate perfectly flat; then grind the end of the tooth slightly concave, so that after soldering a close joint may be secured by using a small burnisher inside the cap, by which the gold may be closely adapted to the porcelain.

Of these various steps in the making of a crown, scaling the enamel from the root is the most important, and bears the same relation to a perfectly-fitting band as a properly prepared cavity does to a good gold filling. The most effective instruments I have found for this purpose are my chisel-excavators and Dr. Jack's hard bits Nos. 13 and 14, the latter being used for the approximal surfaces. But when the teeth are close or in contact, nothing is so effective or painless for starting the work of scaling as the ordinary chisel and mallet used with care. These surfaces must then be scraped smooth with the hard bits just mentioned.

Scarcely less important than the scaling of the enamel is the slight crimping in and burnishing of the upper edge of the band just before its final adjustment. This is necessary because, no matter how nicely the band may fit at first, it becomes somewhat stretched while making the crown.

*Bridge-work.*—If our efforts at saving or substituting teeth were always successful, then it might truthfully be said that we have no need of bridge-work or anything of that nature. But is it not an indisputable fact that, in spite of care and skill and experience, fillings do not always save the crowns of teeth? Nor can all plates be retained in any manner that always proves satisfactory.

All operations in the oral cavity are necessarily "submarine," and the whole art of dentistry may be compressed into one word—*adaptation*. We strive by perfect models and close joints to attain this in making plates, and aim at the same thing by removing angles and rough surfaces in cavities for gold fillings.

The two essential points in the piers and abutments of bridges, as well as in the bridge itself, are *strength* to prevent breakage, and *fluid-tight joints* to prevent leakage.

What is said about bridge-work in this paper does not refer to any particular system, but means a denture of this kind so constructed that, besides having all the qualities of the crown described, it shall have ample strength, admit of easy cleansing, and be entirely free from the gum. It is strictly true to say that a bridge which rests on the gum is no bridge at all. The so-called bridges of this kind are really narrow plates fitted to the parts by the usual impression and fastened around or over the other teeth.

Success in making bridges is no more difficult to attain than in gold filling, the most difficult part being the making of the crowns. Close joints about the bridge proper are almost as easily secured as around a gold fillings, since a thin backing can be closely burnished, and the end of the tooth ground thin and narrow where it rests against the gold cusps.

The most defective and weakest part of a bridge is in the front facings, which when made of the usual plate-teeth are very liable to break off. And we need some strong method of using bicuspid and molars without the expensive gold cusps and palatal surfaces. These defects are overcome, to a great extent at least, by the device of Dr. Williams, which consists in forming or cutting a groove across the top and down the sides of the tooth, and into this burnishing very thin platinum, which is then covered with solder to the required thickness. When such a tooth breaks it can easily be replaced without detaching the bridge. Descriptions and illustrations of this device are seen in "The American System of Dentistry," so that it need not be further noticed here.



*Bridges and Plates.*—A bridge is a new mode of inserting a partial set, and can therefore be compared with or contrasted to a dental plate. A pertinent question here is this: What is the most natural method of constructing and retaining artificial teeth? When the crown, which is the perishable part of the tooth, is lost, dental science but confirms the lessons of experience as to the possibility and advisability of saving the root, as a basis for an artificial crown; and yet, judging from what one often hears and reads, it seems to be assumed that a plate is the normal basis for artificial teeth. It can easily be shown to be the most abnormal and injurious. Is it not a fact that *the teeth and their roots and not the alveolar surfaces*, are originally intended and specially designed to bear the force of mastication? It is not the alveolar border, much less the palatal surface, that normally sustains the impact of attrition. It is of course freely admitted that the dental plate has been and will long be of great service to multitudes of people; but note for a moment the effects of contact and pressure, as shown in the denuded necks of teeth and the wasted alveolar surfaces.

If bridge-work had always been practiced, and plate-work were now introduced, what protests we would hear from the profession, and what complaints from patients! And yet in time dentists would learn to make plates, and patients would learn to wear them.

There are several striking differences between a bridge and a plate. The first is the immovable retention of the former, as compared with the moving, tilting, rocking, or dropping of the latter. The second difference in favor of the bridge is the absence of all pressure or even contact against the mucous membrane. The third difference is the absence of all material that decreases the normal dimensions of the palatal vault or injures the soft tissues. The fourth difference is that a bridge dispenses with all vegetable bases, which by their porosity and non-conductivity have not infrequently been a discomfort to the patient and a source of disease to the parts they cover.

It is by no means asserted that bridges can or should in all cases be substituted for partial plates; but it is claimed that small bridges at least have such marked merits, and plates have such positive defects, that dentistry needs both. Plates do not cover the entire ground of substitution, as the experience of too many patients even from the hands of the best too clearly testify. Every one practicing dentistry should be able to recognize difficult cases for plates before the teeth are extracted, and should know almost at a glance the meaning of small jaws as well as flat, hard, dry, or excessively soft, moist conditions of the alveolar or palatal surfaces. And difficult full lower cases—what practitioner does not know that the only sure remedy for them is prevention? Of course this is not intended for

those whose fillings never fail, whose extracting always extracts, and whose plates have such adhesion as always adheres. But bridges as now made are too costly to be within the reach of all, and for years the rule may be,—bridges for the few, plates for the many. I think, however, that the inventive ingenuity of the profession can be relied on to produce something within the reach of moderate means.

If a partial set on a plate with or without clasps can be shown to be all that is required as to comfort, strength, usefulness, and durability, then perhaps bridge-work is not needed; but in point of fact a large number of partial dentures are partial or entire failures on the score of utility, while at the same time they have inflicted no small amount of injury on the parts covered by the plate and on the remaining teeth.

*Anchorage*.—The value and durability of bridges in general, and of the dental bridge in particular, depend almost entirely on the strength and permanence of the piers and abutments. The health and strength and position of the anchorage roots or teeth are of the utmost importance. The abutments of dental bridges are usually the cuspids and molars or wisdom-teeth; the piers are generally the central incisors, the cuspids, and the bicuspid. The front teeth, when devitalized or badly decayed, are cut off; the back teeth properly shaped and capped in. At the second bicuspid we draw the line between capping in and cutting off. As already stated, the two essential points in all crown and bridge-work alike are *strength* and *moisture-proof joints*, so as to resist the ever-present forces in the oral cavity. In many a case *strength* cannot be secured without removing the crowns of one or two vital teeth that may or may not be decayed. Against this there has been much protest; and what is good or bad practice cannot be settled yet. Nor should the advocate of bridge-work be in haste to brush aside what he may regard as a thin skirmish line of opposition, because there may soon be found a more excellent way than the sacrificing of sound teeth. But the entirely sound teeth aside, what teeth should be cut off for abutments and piers? I answer that I think it good practice to cut off the crowns of any of the eight anterior teeth that are devitalized. In the first place, teeth in cases requiring partial sets or bridges are usually of inferior structure, and when such teeth are pulpless are not very durable or presentable; and a good artificial crown has a better color and is more permanent than a natural one without a pulp. As to the cuspid, which has been too frequently cut off when entirely sound, it can now be capped in (Fig. 6, lower cut), leaving the labial surface exposed. It is not always necessary, even if it were always practicable, to grind off the sides and cap the molars, as these teeth frequently have crown or approximal cavities,

which can be prepared to receive the end of a bar, which is anchored with amalgam or gold. A wisdom-tooth seldom needs any grinding, except on the crown surface; for, of all the posterior teeth, this one is best adapted by its shape to be incased by a cap-crown, to serve as an abutment for a bridge. Of all modes of anchorage, the one least liable to give trouble or change in any way is a vital tooth carefully incased with a cap-crown. But the *neck of the tooth must be closely encircled*, or it will sooner or later be girdled by decay. If for any reason the sides of a tooth, molar or bicuspid, cannot be made parallel, it should not be cut at all, except the cusps, but it should be incased in a cap which extends to the *greatest diameter* of the tooth, or about half way to the gum.

*Limitations.*—Bridges, even more than crowns, require the presence of strong and healthy roots; and besides, they demand that the width of the spaces to be spanned shall be governed by the size and strength of the points of anchorage. Four teeth in a space is the largest number admissible. Whether an upper or lower denture can be attached to four roots or not, depends on the relative smallness of the jaw and the size and strength of the roots or teeth. It must be evident that four strong teeth or roots in a small jaw will anchor a denture more securely than five or six roots in a large jaw; and even in an average case four strong points of anchorage will hold an entire denture more firmly and permanently than the cuspid roots will sustain the six front teeth.

It might be asked of those who oppose bridge-work and yet practice crowning, "Where do you draw the line?" Take a few typical cases: Case 1.—The right lateral is gone; the right central devitalized and badly decayed. In the days of Webb a lateral—an ordinary plate-tooth—was anchored with gold wire into the pulp-canal of the central, this tooth being restored with gold,—a long, exhausting, and not always very durable or sightly operation. Nowadays anyone that does crown-work at all would put on the central a Richmond crown, and to this attach the lateral. Here is a small bridge, though one end "hangs in the air;" or if there is a cavity in the cuspid a spur may extend into it, as shown in Fig. 4. Case 2.—If the remaining incisors were in a similar condition, the other central, even though vital, would be cut off and crowned and the lateral attached as before, all the teeth being soldered together (Fig. 5).—This is a typical bridge, which if properly made is *stronger* and more *durable* and *comfortable* than any piece of plate-work that can be constructed. Case 3.—The first molar and the first and second bicuspid are missing. The cuspid being badly decayed is crowned, the second molar incased in a half-cap which reaches about midway to the gum, and the bridge is attached to these (Fig. 6,



upper cut). This is again a case that can be made very strong and is very easily kept clean. Case 4.—All the bicuspid and molars are wanting and the cuspid sound—the teeth being good on the other side of the mouth. A bridge here would I think generally be advised. Fig. 6 shows the modes of attaching bridges to vital and devitalized teeth.

I will now give a case of my own—one not met with very often,

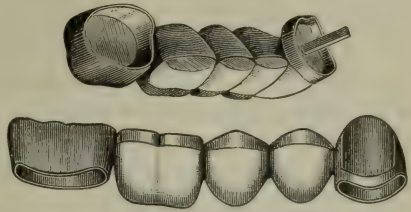
FIG. 4.



FIG. 5.

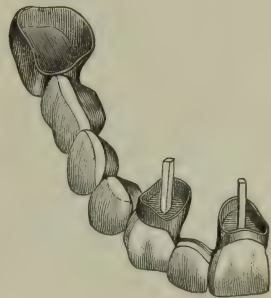
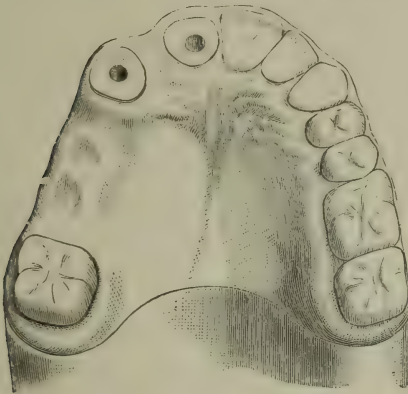


FIG. 6.



and one in which a plate with or without clasps would not be a success. The jaw is small, the teeth short, and wanting on one side from the wisdom-tooth to the cuspid,—this and the lateral, though both vital, being very badly decayed on both approximal surfaces. This is a case which, so far as I can see, clearly shows the superiority of a bridge over a plate. Fig. 7 represents this case, except that

FIG. 7.



the bridge stops at the lateral, which has a pin and band like the cuspid.

If bridges were confined to such small or comparatively small cases, and the same care and skill as are required to make a good gold filling were exercised in each step of the process, I think that the superiority of bridges over many partial plates would be evident to the most prejudiced.

*Making and Attaching Bridges.*—I have not space to enter into all the details of making bridges, but will give only some of the leading points. As already stated, the first essential in making a crown is to have the sides of the root parallel; in constructing a bridge the first requirement is to have the teeth or roots and their canals parallel to each other, in order that the crowns and caps may be drawn in an impression without the least fracture, as otherwise a bridge when soldered cannot be placed in position. The teeth are made parallel either by being regulated or by having their leaning sides trimmed off.

If a bridge is small, or one or two teeth are put into a space, it is a good plan to wax them into position in the mouth with the usual wax and resin, and remove them together in an impression of *investment material*. When a bridge is large it is better to put the caps and crowns in place, and, after taking a plaster impression, make and mount the models in an articulator. The model for the bridge must be marble-dust and plaster, as it finally forms part of the investment.

*Cementing Crowns and Bridges.*—A hard, dense, but rather slow-setting zinc-phosphate is the best material for cementing in bridges. Even when it is slow-setting, an assistant will often be required in large cases to fill the caps, while the operator fills the canals. The canal, as before directed, should be *enlarged toward the palatal side*, which, besides giving greater strength to the crown, enables one to introduce the cement so as to drive out the air.

It has been said that for the purpose of setting crowns gutta-percha is obsolete. I have found that at least one kind of gutta-percha—the “Premium”—is so nearly a perfect plastic for setting crowns and also many bridges temporarily, and any bandless crown permanently, that I consider it second only to zinc-phosphate. The “Premium” gutta-percha has not only the needed hardness, but can be made soft enough for any purpose, besides having no tendency that I have yet discovered of swelling and splitting the root. But there must not be too much used, requiring the crown to be pressed up with too great force. A good way is to press the softened gutta-percha around the barbed and heated pin with the fingers. The proper amount is obtained by two or three trials, before finally pressing the crown into place. Gutta-percha is especially adapted to cases in which the condition of the roots is in doubt on account of chronic abscess or systemic tendency.

*Objections to Bridge-work.*—The art of building dental bridges is too new to be always successful. Even when due regard is had to proper conditions as to number and strength of teeth and their treatment, there are still difficulties to be overcome and problems to be

solved, in almost every case, that demand no small degree of skill and experience. Perhaps the chief cause of failure in this new method of substitution is found in the fact that too many are practicing it without proper preparation.

Nearly all that one reads or hears against bridge-work is based on the assumption that the real or fancied defects are inherent in the system. Little has been said against the want of proper conditions in the teeth or roots and the surrounding parts, and still less about the lack of skill and experience in the operator. It seems always to be taken for granted that judgment and skill have been exercised in selecting and treating cases that are suitable; and it is nearly always assumed that the work is well done. In view of the fact that after years of experience even good operators have not infrequently failures in fillings and plate-work, it would be indeed wonderful if bridge-work were always well constructed and successful. One great obstacle to progress in this kind of work is that it is attempted by too many who cannot make a respectable crown. Again, most of what is generally insisted on respecting the want of strength and permanence applies to a full set anchored on four teeth or roots. Even admitting that such a number of teeth or roots is often insufficient to support an upper or lower denture, I am by no means willing to concede that such is always the fact, for there are cases of relatively small jaws and large, strong teeth in which a bridge could be applied with every element of strength and permanence. It is in just such cases as this—a small, hard, contracted arch—that the greatest difficulty is encountered in adapting a denture, either partial or full, on a plate; and, as just stated, it is in just such cases that bridge-work shows its superiority over plate-work.

The general statement that four teeth cannot bear the strain originally intended to be borne by fourteen or sixteen, assumes that each tooth has just the strength required, and cannot bear any unusual strain. It is true that a long tooth standing alone is liable to lean and loosen, neither of which it can possibly do when acting as a pier of a bridge. A cuspid tooth that is so firmly fixed as to require all the strength of a strong arm to remove it, will certainly bear more than its proportion of the force of mastication. It is *too much movement*, which a bridge effectually prevents, that tends to loosen and detach a tooth or a root.

Though the cuspids are generally the strongest and most firmly fixed of all the teeth, it seems to me that in many cases it is requiring too much of them to support the six anterior teeth (Fig. 8), but that of course depends on the width and curvature of the arch, as well as on the articulation. With an edge-to-edge occlusion, in a



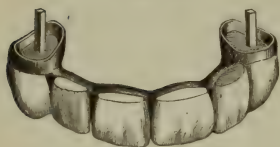
narrow arch, with little curvature, the cuspids can doubtless readily support the six front teeth. But this is sometimes the weakest bridge that can be made, and in nearly all cases a full denture on four roots has more of the elements of permanence. Again, let me say that it is not *direct pressure* that causes teeth to lean and loosen, but it is *mal-occlusion and want of lateral support*.

It may be well to give in detail some objections which are more or less imaginary :

1. Irritation of bands which pass beneath the gum. If these bands fit closely around the neck of the tooth and are finely polished, as they always should and can be, they will not irritate the soft tissues as much as a metallic approximal filling, which from its position is often difficult to trim away and finish. The bands being made of metal that does not tarnish or corrode, demand only some care and skill as to fit and finish, to be entirely non-irritating. The edge of a cavity, the cervical margin of many fillings, the presence of tartar, all stand in decided contrast to a band as irritants.

2. Metallic contact and pressure on the cementum. This is a clearly fanciful objection, since the much more perishable dentine, unless very defective, bears such contact without injury. Nor can the *pressure* of the band which is passed into place with the fingers be of any consequence. Neither can shocks induced by thermal changes of which the

FIG. 8.



patient is unconscious result in abnormal conditions.

3. That the ledges and spaces above and within the band become the receptacles for food débris and vitiated secretions. If such a state of things occurs it is entirely the fault of the operator, being wholly due to careless and unskillful work.

4. Loosening of the teeth and roots. On the contrary, a bridge tends to counteract this evil—too much lateral movement—that affects teeth standing alone, by giving them firm *lateral support*. A loose tooth must be kept from moving as a first condition to becoming firm.

5. Want of motion. Though the act of mastication subjects the teeth to some degree of lateral movement, the chief feature of this force is *pressure*. No matter how a bridge is made, pressure can never be wanting. “Interstitial motion” is more or less incidental, and is of no benefit to teeth standing alone. What such teeth need is not *lateral movement*, but *lateral support*.

The charge of filthiness has been so often brought against bridge-work that it may be well to glance at this subject a little more closely. This condition must exist either in the bridge proper or about the

piers or abutments—in either case being the fault of the operator or the patient. The whole question of close joints in a bridge can be narrowed down to burnishing the backings on the teeth and fitting the bands around the roots; hence it is strictly true to say that a single crown is more liable to be filthy than a bridge or *the part that spans the space*.

I will next pass to some disputed points and real objections. It is said to be bad practice to mutilate sound teeth for the purpose of crowning, capping in, or inserting bars to anchor bridges. This charge has certainly a good basis; but it still remains to determine in what mutilation consists. As a rule the crown of a devitalized tooth is cut off, and that of a vital one capped in,—the first method being applied to the front teeth, the last to the back teeth. I think it will be admitted that a *closely-fitted cap-crown over a vital tooth* will not only outlast most fillings, but is the best protection a tooth can have; and I think the end to be attained in thus incasing a tooth will justify the means, when the advantages of bridge-work are better understood.

Whether drilling a cavity into a sound tooth is bad practice or otherwise, depends on the utility and permanence of the mechanism to be anchored by this method. To say that all cutting of or drilling into sound teeth is bad practice, is to give the patient's rather than the practitioner's view of the matter. When separations were more in vogue than now, some of the best men felt no pangs as they cut large sections from almost or entirely sound teeth. And perhaps the one who objects to incasing a sound tooth would encircle that same tooth with a clasp which has not infrequently destroyed both crown and root. As to cutting off vital teeth,—the cuspids for example,—that is a proceeding I do not indorse, and yet at the same time it is one that I do not presume in all cases to condemn; for there may be, at times, that meeting of conditions which makes a bridge anchored to the cuspids in this way the best denture that can be constructed.

From the foregoing I come to these conclusions:

1. The art of constructing bridge-work has its basis in dental science.
2. If a bridge injures or diseases the mouth, the cause must be sought, not in the *principle*, but in the *construction*, of the mechanism.
3. As to strength and closeness of joint to resist the forces and exclude the fluids of the mouth, a bridge can be made almost as perfect as a filling, and generally much more durable.
4. Bridge-work is neither for the unskillful dentist nor the careless patient; and the interests of conservative dentistry and this new system alike demand that, until skill and judgement are devel-

oped by practice, the efforts of the operator should be confined to small and simple bridges, so constructed as to gain the maximum of strength and durability with the minimum of drilling into or cutting off sound and vital teeth.

## ENAMEL AND DENTINE—SOME THOUGHTS ON THE NEW THEORY CONCERNING THEIR STRUCTURE.

BY GEORGE S. ALLAN, D.D.S., NEW YORK, N. Y.

DURING the last eight or nine years there have appeared at various times articles from the pens of either Drs. Abbott, Bödecker, or Heitzmann, the essential thought of which is that these tissues are living tissues, and that the presence of a living protoplasmic reticulum in both had been demonstrated; and further, that this reticulum was not only continuous throughout each tissue, but the reticulum of each was directly connected with that of the other, and as that of the dentine joined the protoplasm of the pulp-cells, they all formed an harmonious whole,—deriving life, sensation, powers of growth, and development from the circulatory system; and that, owing to the same life-giving connection, they were subject to inflammatory reactions, conditions, and changes, and thereto, in a measure, corresponding to like inflammatory conditions and their sequelæ found in the softer and more highly vitalized tissues of the body.

No one will question that these views are novel and contrary to those universally held up to the time they were promulgated. To call living tissue that which we have been accustomed to look upon as being practically dead tissue, is indeed to make a radical change of base, and one should not be expected to alter his ideas suddenly and decidedly without the best and most convincing reasons, and reasonable doubts and asking for proofs would naturally be expected. In such a case dogmatic assertions alone will not carry conviction, and in truth the more decided the assertions the more decided will be the opposition.

As was to be looked for, then, these new views have excited a great deal of attention and criticism, and a spirit of inquiry has been set on foot which has induced many able workers to look carefully into the subject,—to study the proofs offered, and to repeat the experiments of the authors; and now, with such light as we can collect for a brief article, let us see what the net result has been, and what the status of the theory is at the present time.

First, then, so far as the writer is informed, no other workers in this field have been able to corroborate the statements of the authors



of the new theory. This in itself is a remarkable state of affairs, for the technical methods, as described, are not very strange or peculiar, or difficult to carry out.

No new reagents have been employed. New combinations there are to a certain degree, but the old familiar methods are still there. They are easily followed, and in putting them into practice the microscopist finds himself very much at home. Still, not a new name from all the many able, painstaking observers and workers with the microscope has been added to the short list of three with which the theory started into life; and yet nearly a decade of years has passed since we were first made acquainted with it. Negative results only have rewarded the efforts of those who have followed the directions and paths marked out by Drs. Abbott, Bödecker, and Heitzmann. Not an echo of confirmation has been heard from any quarter.

It is a little remarkable that the principal reagent used—gold chloride—is not especially valuable for demonstrating the presence of protoplasm in tissues. It has a marked affinity for nerve-tissue, and is most useful for demonstrating the finer fibers and terminations of the nerves; but its action is in a measure uncertain and variable, and other elements in tissues than protoplasm and nerve-tissue at times take a stain from it. Osmic acid does stain protoplasm, but it stains fatty tissue more decidedly, and for fixing some delicate tissues has great value. Still, neither of these reagents can be said to differentiate protoplasm in a special or marked manner. It would be a question whether their evidence alone could be accepted as final on a disputed point like the one under consideration. This suggestion is made on the supposition that the specimens of enamel treated with these reagents apparently show the presence of a protoplasmic reticulum.

Let us look at the new theory from another stand-point. A protoplasmic reticulum, as described, must be a reticulum of a soft, semi-fluid character, and one easily destroyed and dissipated by post-mortem changes. It could not exist in the dried desiccated tooth, and in fact the technique described by Drs. Bödecker and Abbott lays special stress on the importance of keeping the sections, through all the changes in preparation, wet. A freshly-extracted tooth must be taken, and it must be cut, ground, and passed through the whole process in the "green" condition. Now, granting the existence of the reticulum in the enamel and basis-substance of the dentine of the living tooth, what story would the microscope tell us in an examination of a dry desiccated section in balsam such as we are all acquainted with? If we are able to follow the bed of the dentinal fibers in all their finest ramifications and anastomoses by the pres-

ence of air in the tubules in such a mount, why should we not be able to make out the form, size, and arrangement of the so-called reticulum in the same way? The protoplasmic reticulum in character must be very much like the dentinal fiber, and like the fiber must be inclosed in solid walls. Otherwise it could not exist—at least not as a *living* reticulum. Is it not plain, then, first, that in the desiccated tooth both reticulum and fiber will disappear, and second, that in a prepared section of such a tooth, mounted in balsam, the size, arrangement, and character of both fiber and reticulum—being similar in character and having like environments—could be demonstrated in the same way and by like optical means? We all know that the dried sections, balsam-mounted, show no evidence whatever of a reticulum, though they plainly and in the most marked manner demonstrate the existence of the fibers in their minutest details.

Another way to look for confirmation of the theory would be by chemical analysis. So large a proportion of animal substance, as evidenced by the drawings and descriptions given in illustration of the reticulum, would necessarily indicate a much larger percentage of animal matter than that given in the books for enamel. An average of not over five per cent. animal matter would strongly contraindicate its presence, and as not over half that amount of organic matter is oftentimes found, the difficulty in the way of explaining its existence is greatly increased. It must, indeed, be a very low grade of living tissue. And how is it nourished?

But the reader will say that we cannot reason away a demonstrated fact. The investigators alluded to not only give all the details of their methods of procedure, but give drawings taken from the actual specimens, showing plainly the reticulum, beautiful in appearance and accurate in every detail. Well, the writer has read pretty much all that has been written on the subject, and has seen and admired the finished proof of Prof. Heitzmann's skill as a draughtsman; and last, but by no means least, has had the privilege of examining the specimens themselves,—the foundation-stone of the whole theory,—and is still an unbeliever. In fact, the examination of the specimens afforded the most convincing proof of the non-existence of the reticulum.

Shortly before the reading of Dr. Abbott's paper—"A Contribution to the Study of the Minute Anatomy of Enamel"—before the First District Dental Society of the State of New York (see the DENTAL COSMOS for April, 1887), the doctor most kindly and cheerfully, in answer to a request to that effect, placed some of his best specimens in the hands of Dr. Andrews, of Cambridge, Mass., whose position as an acknowledged authority in such matters is unques-

tioned, and of the writer, and we were told we might make any examination of them we desired. What opinion Dr. Andrews formed as to the presence of the reticulum will be found over his own signature at the end of this article. The writer will briefly give the results of his examinations here:

The instrument used was a Zentmayer grand stand, to which was fitted a Powell and Lealand achromatic condenser. The glasses employed were a P. and L. water im.,  $\frac{1}{8}$ ; a Hartnack water im., No. 9, equivalent to about a  $\frac{1}{12}$ , and a Gundlach No. 7 water im., equivalent to about a  $\frac{1}{16}$ , all superior glasses, and every care and pains were taken in all their adjustments and in managing the illumination.

Several hours' time was consumed in the examination. Each observer made his own observations independently of the other, and no comparison of views was made until each had fully satisfied himself and fully made up his mind. *The writer could not make out any reticulum, nor in fact anything resembling one. The specimens were worthless for the purpose intended.*

It is both easier and pleasanter to agree with one's friends and co-workers than to disagree, and it seems an ungracious task to criticise those who have shown you kindness and courtesy; but the cause of truth cannot allow these strange views, so dogmatically asserted, to remain longer unchallenged.

We must remember that this is not a theory built up with recorded and accepted facts, but a new departure, which must stand or fall only in so far as it is capable of demonstration. The specimens must show what they are said to show, and trained eyes must not be asked to take that for granted which they cannot see.

The writer is not prepared to say there is no living matter in the substance of the enamel, or in the inter-fibrous substance of the dentine. The interrogation mark still hangs out here. But he does deny the existence of the protoplasmic reticulum as described and figured by Drs. Abbott, Bödecker, and Heitzmann.

CAMBRIDGE, MASS., May 2, 1887.

DR. GEORGE S. ALLAN, NEW YORK:

DEAR DR.: In your letter of April 22 you ask me to give my ideas in reference to the new theory of the structure of enamel, and also to give the result of my recent study of Prof. Abbott's slides illustrating his paper on this subject.

In regard to the new theory of the structure of enamel, I have given all the time I could spare since hearing the paper read by Prof. Abbott, and have examined many slides of thin enamel, some of which were examined by Prof. Heitzmann in his laboratory and pronounced by him to show the reticulum. These specimens I have examined critically, with a most excellent  $\frac{1}{5}$  objective of Tolles, and am assured that nothing like the reticulum figured by him can be demonstrated in them. In regard to the recent study of Prof. Abbott's slides, which he



so kindly loaned for that purpose, I could find no appearance whatever of fibrils resembling the exquisite drawings made by Prof. Heitzmann, illustrating the article published in the April number of the DENTAL COSMOS.

Very truly yours,

R. R. ANDREWS.

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### IMMEDIATE ROOT-FILLING.

BY C. EDMUND KELLS, JR., D.D.S., NEW ORLEANS, LA.

AN article under the above caption, in the April number of the DENTAL COSMOS, attracted my attention solely from the standing of the author and of the journal in which it appeared. Had it been read in one of the little "quarterlies," and credited to an unfamiliar writer, it would need no notice.

The immediate filling of some thirty roots within a year—roots in which a portion of the pulp was alive—is deemed worthy of public attention. That each and every one displayed some vitality is insisted upon; therefore, roots containing dead pulps, roots in every stage of inflammation, are not therein considered, and are consequently not deemed capable of immediate filling. Now, what in fact is the "state of the art" at present in regard to treating pulpless teeth? I believe that dentists all over the country are filling, *at one sitting*, pulpless roots,—roots in all stages of inflammation, as well as those in which the pulps are wholly or partly alive; and not only filling them, but doing so successfully. At the time of learning this method I was fortunately favored with an epidemic of pulpless teeth, and of the first one hundred and thirty cases within two years a careful record was kept (as well as was possible under the varying conditions), and no failures ensued to my knowledge. This sufficed to convince me of the soundness of the doctrine.

To-day a root is treated as a simple cavity—cleaned, and filled at once, no matter what its condition. I know of but two exceptions to this rule,—one when so much swelling of the face exists as to render operating impossible; and again when there is so much bleeding through the foramen (in this case, of course, the pulp was alive, in part at least) that too much time is required to stop it. In each of these cases a second sitting is needed to complete the filling of the fang; but fortunately these conditions are not often met with.

If the abscess is caused by the dead pulp, and we remove that, from what source are we to look for further trouble? None.

If any débris is forced through the foramen, irritation will follow, but may usually be readily controlled. If all the pulp is not removed, failure may result from the imperfect operation, not from the imperfect method employed. I believe that any root may be cleaned as well in one sitting as in a dozen. That it is possible to fill all,

absolutely perfectly, I do not believe, but a degree of perfection is attained by the careful operator that insures success. To those who use them, drills and barbed broaches may be necessary; but to my mind they are dangerous, and I am content to be successful without their use. The natural size and shape of a root-canal I do not care to improve (?) upon. If too fine to fill, no trouble will ensue. The dead pulp in a canal too small to admit of a Donaldson smooth bristle need not be feared. It is immaterial what filling material is used,—all that is needed is one that is adapted to the exigencies of the case. Carbolized orange-wood and Guillois's cement subserve my purpose. For the cleansing of the canals, carbolic acid, c. p., and *nothing else*, is used.

Before dismissing such a case, it is indispensable to see that in the natural occlusion no pressure is brought upon the tooth.

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## PROCEEDINGS OF DENTAL SOCIETIES.

### NEW YORK ODONTOLOGICAL SOCIETY.

THE New York Odontological Society held its regular meeting, Tuesday evening, March 8, 1887, in the parlors of the Academy of Medicine, No. 12 West Thirty-first street.

The president, Dr. E. A. Bogue, in the chair.

#### INCIDENTS OF OFFICE PRACTICE.

The President. If none of the gentlemen are ready to offer anything under the head of Incidents of Office Practice, I will take the liberty of exhibiting a little apparatus which was described about a year ago to the society in a communication from Dr. Rosenthal, of Liège, Belgium, and published in the DENTAL COSMOS for October, 1886. In this case the ramus of the lower jaw on one side was amputated, rendering mastication by the patient quite impossible. After six months the patient recovered, and by the aid of this apparatus was able to masticate. The patient is now chewing with the remaining teeth, the ramus on one side being gone. Dr. Rosenthal has also presented to the profession this instrument, which I will pass around. It is designed to facilitate the washing out of blind abscesses. The lower end of the exhaust tube is attached to an ejector operated by the city water supply. That force draws the pus from the abscess into the glass tube by turning the little stopcock at the middle, the antiseptic fluid is drawn into the tube adjoining, while at the same moment the pus is drawn out of the sac above the root of the tooth into the glass tube below. Turning the other stopcock reverses the process, and the antiseptic fluid is thrown up into

the sac whence the pus was extracted, and the pus goes off in the drain-tube. Another turn of the stopcock and the process is repeated, and so on as often as desired.

Dr. W. H. Dwinelle. Mr. President, Dr. Williams, of Boston, is here with something very interesting to show us.

The President. We shall be pleased to hear Dr. Williams.

Dr. J. L. Williams. I came away from home in somewhat of a hurry, but brought with me an instrument which I have found very useful, and which includes an idea of my own. It is an ordinary corrugated thimble to fit the finger or thumb, to which are attached rods with two universal joints about half an inch apart. One of the universal joints is connected with a rod that is attached to the thimble, the other with a rod attached to the lens, giving great facility of adjustment. The S. S. White lens which you see advertised for examining cavities is useless for all ordinary purposes in operating, because the focus is too fine, and it is therefore very difficult to adjust. The lens that I use has a less limited focus, but magnifies sufficiently for all operating purposes. My old preceptor, Dr. Keep, once said to me: "The watch repairer has good eyes, but he uses a glass to look at small things; the microscopist and the engraver also use a glass to examine objects smaller than their eyes are adapted to. Therefore, why should you pretend to have microscopic eyes. You must look at small things with the lens if you wish to be accurate." So I learned the use of the lens in my early practice, and have found it of great advantage. It is one of those things that a man should learn before he is obliged to from sad experience. You can set this lens at any needed distance from the cavity, and put it on the thumb or any finger, thus having the fingers free. The necessity for magnifying small points in the mouth is acknowledged by most operators in the fact that they use magnifying mirrors. Most of the magnifying mouth-mirrors are too convex; a little jar will put them out of focus and confuse the operator. I can get a better image with a plain mirror, and with a lens of proper focus.

The President. Gentlemen, I will ask Dr. Atkinson to make a few remarks concerning a specimen which he has.

Dr. W. H. Atkinson. We are now very much interested in replanting, transplanting, and implanting teeth, and on the *qui vive* to arrive at correct apprehensions of the process and the basis upon which to plant our hopes. In this bottle are two specimens; one extracted on the fifth of last February that had been in place fourteen years. It shows absorption near the end and down on the anterior face of the root, which seems to have been well attached behind and on the lateral surfaces. I am puzzled to know why it was extracted. It



seems to me that if the walls were sufficiently sound to give the appearance that is presented, the absorbing end of the root should have been amputated and the reproduction of that portion of the socket hoped for. I am informed that it was implanted by Dr. Bing, of Paris, in 1874, and it is therefore a very instructive specimen. The evidence of healthy attachment is clear, though. I have not looked at it except with a hand lens. As far as the immediate condition of the connective tissue is concerned, that can only be determined by making a section and putting it under a high magnifying power.

There is in this specimen a beautiful example of the indestructibility of gutta-percha as a filling material, for up to the very margins there seems to be no decay whatever. The instruction to be gained from this specimen depends upon the result of the future examination under the microscope; that is to say, whether this retrogression of the elements of the tissues was akin to the absorption of the roots of temporary teeth can only be settled by an examination more minute than we can give it without cutting.

In the other specimen we have the root of a tooth showing the reverse order of the loss of the tooth-substance. This tooth is reported to have remained in place thirteen years after transplantation. The root is somewhat wasted, the apex being better preserved than the other parts.

What I am particularly interested in, is that these specimens teach us the lesson of not claiming to know things that we do not know, and not saying what is to be until we have sufficiently settled the principles, and our ability to recognize them, that are involved in cases of implantation. You remember what I said in this room when Dr. Younger was before you, that my expectations were great for the success of implantation; but my great desire was to have it placed fairly and thoroughly before the profession, so that operations might be made, observations had, and results attained that might afterwards be recognized and their value appreciated. Now, here we have a case of a transplanted tooth remaining thirteen years in the mouth in good condition, and useful for at least twelve.

Dr. Kingsley. Was it a case of implantation or transplantation?

Dr. Atkinson. Transplantation, as I understand it. In the preparation, was the socket cut out so as to remove all of the soft tissue?

The President. Probably not.

Dr. Raymond. How old was the patient?

The President. Probably thirty-eight or more when the transplanting was done.

Dr. Atkinson. What has pained me most has been the tendency

of very good men in the profession to prophesy how things were or must be, and to throw cold water upon histological and embryological researches which are beyond their comprehension, and upon which they are not entitled to an opinion. I am pleased to see this case, and to see in it some evidence to support the idea that there is a nutritive connection established between a tooth taken from one mouth and the socket in which it is implanted in another mouth. There is here a very evident and very nice connection. There is an opportunity here to study the changes that occur and the retrogressive metamorphoses that take place. Some portion of this looks like the solution that occurs in children's teeth, leaving a lot of sharp projecting corners. Other portions have the appearance of chemical dissolving. It is our trouble that we forget that all solution is chemical. We make a distinction where there is no difference. Dr. Bogue is an excellent fellow to ask questions in a way to elicit facts; and when he gets something that seems to answer the questions he is always ready to have it brought out so that it will benefit somebody. If we are to be an intelligent body it will be brought about by this method,—by presenting our own perception of principles and listening to that of others; and he who don't perceive the truth, so much the worse for him.

Dr. Kingsley. Was the tooth under discussion one that had been freshly extracted when it was transplanted, or was it an old dried specimen that had been out of the mouth for years?

The President. The patient from whose mouth these specimens were lately taken has honored me with her confidence for twenty years. Thirteen years ago her two upper cuspids were extracted by Dr. Bing, of Paris, France, and these two transplanted in their places, they being taken from the mouth of another patient on the spot. Last year a trouble of the cornea in her right eye developed, and a question arose whether these transplanted teeth could by any possibility have any connection with the eye difficulty. I did not believe they had; neither did Dr. Roosa, to whom the patient was sent; but as the right cuspid, which had been in place over twelve years, was completely gone, nothing being left but the tip of the root, I had no scruples in removing it. The left one was so loosened, the hold being three-sixteenths of an inch only, that, at her request, I took it out also. This tooth I filled myself nearly a dozen years ago, just after it was transplanted, and the root was filled with cotton at that time. It will be seen that I have had opportunity to keep quite a close watch upon these transplanted teeth for the last twelve years, but the operation itself I do not know about except from hearsay. I was also informed in Paris, two years ago last winter, that a certain gentleman several years previously had gone so

far as to implant teeth into sockets artificially prepared by himself, which teeth had been taken from a patient in an adjoining room; that those teeth were deprived of their pulps, the roots filled, the teeth and sockets antisepticized, and every precaution known to modern dental science observed; that the teeth became firm and remained so for over a year, and then gradually loosened from absorption of the roots, and at the end of two years there remained but one of all that were implanted. The gentleman who told me this had witnessed the operations referred to. As the name has since come to me from another source, I now feel no hesitation in saying that it was Dr. Bing who did it. When Dr. Younger was performing his operations of implanting, I wrote to him concerning this experiment of Dr. Bing's, and also asking him if it was not a little premature to claim success as certain before sufficient time had elapsed to determine whether the operation was to be permanent or not. The alveolus is in a certain sense a temporary tissue,—one which if the teeth are once extracted is partially filled up and partially absorbed. It would seem as though such alveolus would not remain through the major part of a life in good condition around a tooth implanted within an artificially made socket. Time and further experience alone can show what amount of durability may be expected from such operations.

Dr. Atkinson. That is the point which I esteem of the most importance of all, and it was the ground upon which I entertained the hope that Dr. Younger had inspirationally hit upon more truth than he appreciated. The new socket being cut in the cancellous portion of the bone, where there was myxomatous or embryonal tissue that had never been formed or converted into bone, gave nature a pocket in which to generate the tissue that constitutes the connection between the peridentium and the tissue that is newly formed from the pabulum wept out from the neighborhood. That is the ground upon which I place my hope to-day as being more reasonable, because the socket is entirely made anew in the bony structure, rather than, as has been shrewdly suggested by your president, in the presence of a tissue that is decidedly deciduous. When we extract a tooth there is always a part of the jaw, the alveolus, that is afterwards absorbed. If we can get a conception of that process and go on a step at a time, I think we may arrive at sound conclusions. I feel that a new tissue that is formed from the source of the circulation has a better opportunity in an entirely fresh socket than it would have in an old one that contained debilitated tissue.

The President. I have transplanted quite a number of teeth; I think several of the gentlemen here to-night have seen at least one of them by the electric light, where the re-established circulation



was quite perceptible. In one case the transplanted tooth was so much smaller than the socket that was to receive it that it fell out within five or six minutes after being put in place. I selected one a little larger, from the same mouth that the other was taken from, placed it in the socket and held it in position by means of a gold screw inserted in a filling in the next tooth. By accident or misunderstanding that gold screw was allowed to remain a year and a half. Last summer that patient came in, and I found the socket, which was so small as not to offer any support at all, was all filled up and the tooth was as firm as any tooth in the mouth. Whether it is bony structure that fills it I am not prepared to say.

Dr. Atkinson. If I were to delineate all the footsteps of the embryological changes that occur from the time the blood-plasm is wept out, through all the changes of the entire domain, I could account for the closing-in of that large socket. Until we get an understanding of how the embryonal tissue is elaborated that constitutes the bond of union between an implanted tooth and the surrounding territory, we can have no hope of settling the question. I have not had opportunity to dissect any of those cases because, as I have before said, the patients were not accommodating enough to die and will their jaws to me for examination. In several instances absorption has taken place entirely out of the order of the normal retrogressive metamorphosis in what is called a carneous body, and the tooth-substance has been penetrated like worm-holes in all directions through the dentine, sometimes straight and sometimes tortuous, as you see worm-holes in wood. That is why I say let us not go too fast, nor ascribe results to causes not known. There is to me abundant evidence here that the connection was healthy. The length of time the tooth has been in proves that, and I will be able to prove it to any man who has sufficient discrimination to distinguish between necrotic and living bone, when the sections are made and put on the stage.

Dr. Dwinelle. Will Dr. Bogue tell us what was the effect of the extraction of the teeth upon the lady's eye?

The President. None at all.

Dr. Geo. W. Weld. It is the usual thing to find absorption of replanted teeth taking place near the central and cervical portions rather than at the end of the root. I should say that in nine cases out of ten it takes place from the centre of the root towards the cervical portion of it. In a great many cases of absorption of such teeth the end of the root remains perfectly intact, while the main body of the root is pitted with bay-like excavations. The cementum on the end of the root is thicker, and seems to withstand the action of erosion better than dentine or thin cementum.

Dr. Atkinson. I agree with Dr. Weld that the majority of lost replanted teeth are absorbed from the middle of the length of the root.

V. H. Jackson, M.D., D.D.S., was introduced and read the following paper, exhibiting a number of models of completed cases, together with the apparatus used:

#### SOME METHODS OF REGULATING.

Gentlemen: It is my privilege, in response to your invitation, to consider with you this evening some of the various methods of regulating teeth, and to determine if possible the most practicable methods in the cases presented.

It is my custom, before choosing the method to be pursued, to prepare models of the upper and lower teeth, that their articulation and the position of those to be moved can be more fully apprehended and the models preserved for future reference. The method that will cause the least pain and inconvenience to the patient, the least injury to the teeth and surrounding structures, interfere least with articulation, and move the teeth to the position desired in the shortest time, should be adopted.

I believe that as dentists and members of societies we should deal more with practical cases, and not speak so much as is common from a theoretical stand-point, if we wish best to assist our fellow dentists. With this feeling I have brought before you this evening several models illustrating the position of the teeth before and after regulating. The appliances used in these special cases, both for moving the teeth and to retain them in position, are also shown.

Case I. The patient was nine years old; superior maxilla very much contracted. The right superior lateral stood considerably back of the central and cuspid, the space being nearly closed, and the temporary molars were somewhat decayed. I used a modified form of the "split plate" with piano-wire bent in the form of a loop, the flattened ends being attached in the rubber to join the lateral halves, as recommended by Dr. Coffin and described in the recently published second volume of "The American System of Dentistry."

But it is my method of retaining the plate in this and all similar cases to which I wish to call particular attention. I have used the rubber plate extending over and about the teeth, as recommended by Dr. Coffin, very successfully; but there are many objections to the plan of covering the teeth with rubber, and I am anxious to avoid doing so if possible. It is necessary to have the plate retained firmly in place, in a way that the patient can remove and cleanse it at will, while the articulation and comfort of the patient should not

be interfered with, as is usually the case where the rubber extends over the teeth. This is best accomplished in some cases by so carving the model at the necks of the teeth that the rubber plate will crowd the gum back and clasp the teeth firmly at their necks. When this will not retain the plate, holes can be drilled into its edge, pins of wood driven in and shaped to fit between the necks of the teeth, and the plate sprung into place.

But the above methods will not at all times answer, especially when great force is needed. In young patients there can always be found a way to extend the spring-wire from the rubber around or over one or more molars to act as a clasp to retain the plate. In older persons space can be made between the teeth by wedging, or the clasps can be extended around the distal molars and the required attachment thus secured. In the case before you the first method was adopted.

Frequently the first and second molars are absent, and if not it may be time for one or more of them to be removed; or they may be so decayed on their approximal surfaces that room can easily be made for the clasp by dressing between them. The wire can be extended directly over any place that the articulation will permit, and then around the tooth, to form a clasp, or it may be more practical to extend the spring or clasp around the last tooth. In this case it was extended around the sixth-year molar on one side and a temporary molar and the centrals on the other. To get the best effects of the clasp it must be well adapted, and the point carried well up about the neck of the tooth, and so formed as not to irritate the gum.

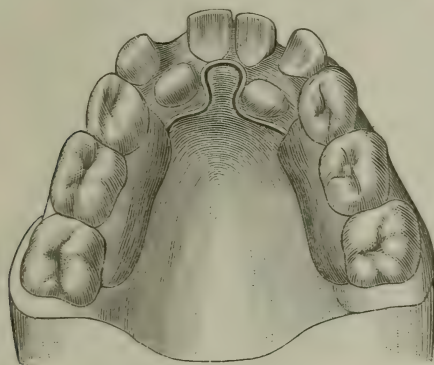
As the models are examined, it will be seen that the arch was first spread by the plate described, and then wooden pins so inserted as to force the lateral forward toward the central. Later the pins were so changed in position as to send the tooth outward.

The plate was inserted April 22, and taken out July 10, the teeth then being in proper position, although not fully erupted. A retaining wire, after the idea suggested, I think, in this society several years ago by Dr. Atkinson, was used very successfully, and worn until September 15, when the patient was discharged. Dr. Atkinson recommended half-round wire for retaining. I use round platinum and iridium wire, forming it upon a plaster model, by starting on the palatal surface of the molars, and following the line of the gum; bending the wire sharply, with the fingers or the clasp-benders, to such form as will best clasp the necks of the teeth. It can be extended around the entire arch to the place of beginning, or pass over at any place the articulation will permit. Short pieces of the same material can be passed between the teeth or over certain cusps



to stiffen the appliance and to keep it from riding on the gum. These pieces should be soldered with pure gold. If necessary to connect between the front teeth to stiffen the retaining wire, slots should be punched in the ends of a narrow piece of thin platinum plate to receive the wire, and pure gold flowed over all. I have found this a most valuable retaining appliance, and after a little experience it can be used in a majority of cases. It can well be called a crib, and used in a great variety of forms. It was used successfully to retain a right superior central that had been drawn back from a very prominent position where it had overlapped the left central. A crib was made to fit over and around the bicuspsids on the left side, from which a wire was extended along the palatal surface of the teeth to the space between the centrals through which

FIG. 1.



the flattened wire passed and hooked around the right central. It could be displaced and cleaned by the patient, and there was nothing in sight but the slight end of the hook. It takes but a few minutes to construct such an appliance. The same method can be used for the attachment of cords or rubber rings, where traction is needed toward the distal part of the mouth, the crib being made to extend over two or more teeth as the case requires, and a hook formed at one side at any angle desired to make proper tension.

Case II. We will now consider a more complicated case,—one that calls for more experience and knowledge of regulating. The patient is a lad about ten years old, with the lower arch much too narrow, each of the lateral incisors having erupted far back of the proper line. The space on the right side was nearly closed, while on the left it was much too narrow to admit the lateral, as will be seen by reference to the models. (See Fig. 1.)

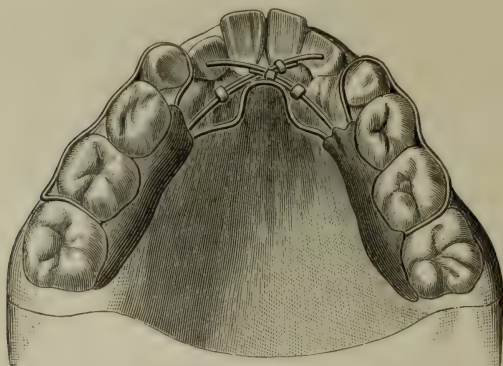
The temporary molars, cuspids, and sixth-year molars were in proper position. A plate was made, using spring-wire to join two

sides of rubber which extended on the inside of the cuspids and molars, the spring being bent into the form of a loop or circle in the centre, and extending above and between the laterals. This was so arranged that the jaw could be spread at the position of the cuspids sufficiently to allow the laterals to take their proper positions, and at the same time the distal part of the arch was widened.

The plate was retained in the same general way as the one before described, excepting that platinum and iridium wire was used, it being made to conform to the shape of the buccal surface of the teeth, passing around the cuspid and molars, and was attached in the rubber at either end.

The force necessary to move the laterals forward was gained by a spring-wire attached in the rubber on one side, and following the curve of the jaw, passing back of the loop described to the palatal

FIG. 2.



surface of the lateral on the opposite side. These springs not only pressed the laterals forward, but assisted in the expansion of the arch. The loop was opened as often as was necessary, and the springs were at the same time bent forward. The springs soon had to be lengthened to follow the movement of the laterals, which was easily accomplished by using platinum wire with two rings of gold plate so attached that they would pass over the end of the springs, and by adjustment the desired length was attained. As the laterals moved forward the springs were necessarily bent to pass in front of the loop. (See Fig. 2.)

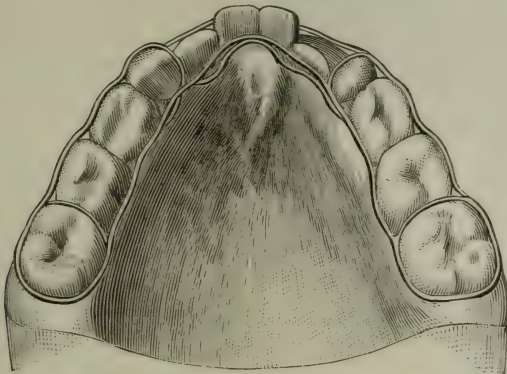
The plate was inserted September 30, and the following February 27 the teeth were in position. The retaining wire was then applied and was worn several months. (See Fig. 3.)

This is a very simple and perfect appliance,—easily made, requiring slight attention, readily displaced by the patient, and not interfering with articulation or mastication. Any degree of pressure can

be exerted that is desired, and, unlike in case of the Coffin plate, the front of the arch can be widened and the distal part not changed to any extent, or *vice versa*.

Case III. I will now present models of a set of teeth that I commenced to regulate in 1882, the superior incisors of which closed back of the inferior incisors. (See Fig. 4.) Measuring from the

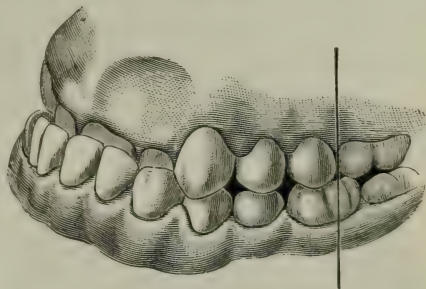
FIG. 3.



back of the right superior lateral to the front of the right inferior cuspid, the lateral appears to be about one-half inch back of its proper position.

The case did not appear to be a difficult one to regulate, and it was not difficult to bring the superior incisors into proper position, as seen by Fig. 5; but when I supposed that the regulating was completed, and the teeth had been retained several weeks, a serious complication began to arise that I could not correct, as the patient would not submit to the methods suggested. This complication is one often met with, though we hear very little said about its real cause. The father of the patient has a very prominent lower jaw, and I found, quite to my dismay, that the lower jaw and teeth of the patient were constantly moving forward on the bite. At this date the jaw is still continuing to grow forward. Contrary to the general rule, the jaw is taking the form of that found at birth and extreme old age. In other words, there is no distinct angle, as looked for at the age of puberty, or approaching adult life. I sent the teeth for-

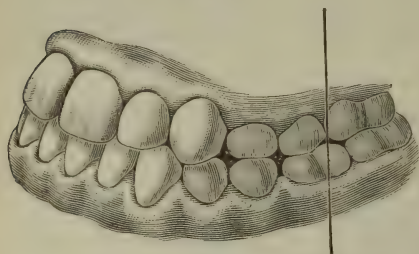
FIG. 4.





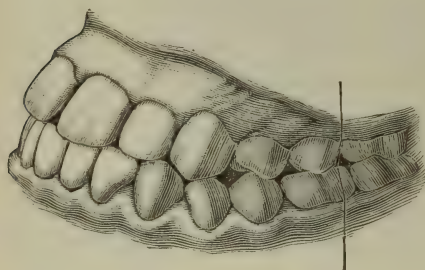
ward again, and there being still a constant growth, I was obliged to move all the teeth in front of the second bicuspid forward for the third time by a system of wedging. A plate was then applied

FIG. 5.



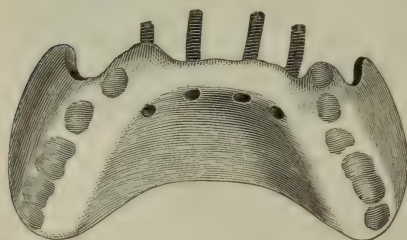
The plate used was the old style plate made of rubber extending over the molars and bicuspid, with silver screws inserted into the rubber back of the incisors. (See Fig. 7.) As the teeth moved

FIG. 6.



forward the screws were bent so as to rest nearer to the neck of the tooth, and the pressure was thus kept at the proper point; a slight turn would make pressure at the mesial or distal edges, thus turning the tooth as desired.

FIG. 7.



Case IV. I will now present to you models of a case with an appliance that has proved very effectual for rotating teeth where the ordinary band used for that purpose is inclined to loosen or slip. The band is thickened on one side to form a nut, in which

to retain them, and still the lower jaw is growing forward and a separation occurring between the upper and lower teeth. (See Fig. 6.) The patient will not wear an appliance to draw the jaw back, and I can only wait to see to what extent nature will separate them.

a thread is cut, and the screw running in it is left long enough to form an arm or post, to which an elastic band or cord can be attached and fastened to some tooth in order to give the proper direction to the tension. The crib can also be used as before described, a hook being attached at any point desired.

The hole in the nut can be made at any angle to get direct tension, or to hold the arm nearer the roof of the mouth; or the arm can be bent to get the same result. The band should be set with

zinc-phosphate and tightened with the screw before it hardens. In this case no difficulty was experienced from the loosening of the band. The patient was about twenty-two years old, and the retaining band was worn at night for about four years. It will be noticed by the model that one of the temporary cuspids is still in place.

Case V. The next models presented represent the teeth of a lady over thirty years of age. Three weeks ago yesterday the right superior cuspid articulated inside the lower teeth, and to-night I present the model with the tooth in position, it having moved, by measurement, about three-sixteenths of an inch. It is unnecessary to say it moved with great difficulty. The plate that did the work is simply a rubber plate covering the roof of the mouth, and fitting snugly about the necks of the teeth, as before described, having a single spring well fitted and curved to press against the tooth.

Case VI. The next model presented illustrates my method of regulating a prominent cuspid with insufficient room. I usually extract the second bicuspid, and use a curved spring extending through the space from a rubber plate. This spring reaches around the cuspid, and having a drawing tension backward and inward, both teeth are moved by the same tension.

#### *Discussion.*

Dr. N. W. Kingsley. In regard to appliances for regulating, I am reminded of a query that was put to me once by a young man: "What kind of a fixture do you use now for regulating teeth?" I cannot regulate teeth with any one fixture. Some variation of an old appliance must be invented for almost every case. I once started out with the idea—it seems idiotic as I think of it now—that I could publish descriptions of a sufficient number of cases to cover the whole ground of regulating, enabling anyone who came after me to hunt up the particular case that met his need and he would find the treatment fully described. But the more I went into it the more hopeless the task became. It is simply impossible. Some of the appliances that will do well for me in my cases and with my habits would not serve another as well. Dr. Jackson spoke of a cuspid that was shutting inside of the lower teeth three weeks ago, in the mouth of a patient over thirty years of age, and which to-night is out in place. I am glad it is. Some people would have taken six months to get it out. I have seen the same thing done in seven days with a jack-screw. I do not know that there is any objection to doing it rapidly. I would use the jack-screw, and if there was room for the tooth to come into place that would drive it out in short order. The explanation of that rapid moving of a tooth is that the alveolar process gives way. There is no absorption in such

cases on the outside, nor any deposit within the socket, in so short a time as that. The thin alveolar process is forced out, and the tooth being retained in its new position, the space behind will be filled up again. I have done that several times, and I do not see any objection to it.

Dr. Hodson. How many days did you say it took in the case you spoke of?

Dr. Kingsley. I did it once in seven days for a patient thirty years of age.

The President. I would like to ask Dr. Kingsley's opinion regarding those models which were presented at the last meeting from Dr. Colignon, of Paris. The question then arose whether there had been a "jumping of the bite."

Dr. Kingsley. There is no question about it. It is evident enough to my eye that the bite has been jumped. "Jumping the bite" is one of the simplest things that I know of. Many of the irregularities that we have to deal with result simply from the pinching-in of the upper jaw at the sides, throwing the lower teeth just one tooth further back than they would otherwise be, and giving the appearance of great prominence in front. If the upper jaw in such a case is spread a little, the bite will be jumped forward and the whole difficulty is corrected. For spreading a jaw under such circumstances as that I prefer a jack-screw. I have tried Coffin plates, with which the jaw can be spread, to be sure, but the work is not done with that positiveness which attends the use of the jack-screw, nor is it done as quickly.

Dr. Williams. Has Dr. Kingsley ever seen any cases of the devitalization of teeth resulting from the rapid moving that he speaks of?

Dr. Kingsley. I do like occasionally to come before a body and acknowledge failures. There is a sort of satisfaction in it. But to tell the truth, I do not know that I have ever destroyed the vitality of the pulp of any tooth that I have treated for irregularity. It may have occurred, but such a case never came to my knowledge. I have seen such a result, and have been told by the patient that it had followed the treatment for irregularity by some other dentist, but I do not know whether it was true or not. I have at times trembled with fear that a tooth that I was so treating would drop out before my eyes, so loose have I seen them, but as yet I have been spared that misfortune.

Dr. Williams. Early in my practice I saw some cases of devitalization of pulps from too great rapidity in moving teeth. One case that I remember was due to the persistency of the patient in bearing pain for the sake of facilitating the regulation; the result was a devitalized central incisor.



Dr. W. H. Dwinelle. I can give some little testimony in regard to regulating teeth, having had considerable experience with that branch of the art; and I have had some extreme cases. I remember a lady, between forty and fifty years of age, whose right superior cuspid was so far within the arch that it interfered materially with her articulation; it was almost in the center of her mouth. I brought it out into line in six weeks. There was a great deal of solid material to break through in order to bring the tooth into place. I used the steel jack-screw, which instrument I had the pleasure of introducing to the profession many years ago. There was no devitalization of the pulp, although the movement was comparatively rapid; neither have I ever known a case of devitalization resulting from the use of such a fixture. I would like here to add my testimony to that of Dr. Kingsley and others in reference to the action of jack-screws. I think it is preferable to all other means of moving teeth, and the effect of it is comparatively harmless. It is positive and direct. Instead of depending upon the elasticity of the fixture, as was mostly the case before the introduction of the jack-screw, we depend upon the elasticity of the tooth and the alveolar process; they are elastic, and we use a direct and positive instrument which has no elasticity and forces the parts apart with comparative impunity. A fixture with an irregular pressure or tension will cause more inflammation. It is the wiggling of the teeth and the vibration backwards and forwards that causes the most irritation. We all know that when a sensitive tooth is grasped in the fingers or wedged firmly to its place while being filled, the pain attending the operation is greatly relieved. The jack-screw is positive in its action; you may screw it up to the utmost bearable point, and in a few minutes the pain passes away, while the process of regulating advances with great rapidity.

Dr. Williams. In regard to the force exerted by the jack-screw, there is another idea involved. The jack-screw gives a certain pressure, and then the tissues have a chance to rest. It is continuous pressure, like that of rubber bands, that causes irritation and devitalization; too continuous effort of any kind brings exhaustion. Alternate exercise and rest is the principle of health; and the use of the jack-screw implies that.

Dr. F. Y. Clark. I have heard within the last few months a great deal in regard to regulating teeth. At the great meeting held in this city some months ago much was shown and said upon the subject, and if one were to believe one-half of it he might truly say the whole thing is simple and easy. But it was very evident to the experienced practical mind that all was not quite as represented. There was a great deal of *impractical theory and machinery*, but—and the

omission was quite noticeable—no failures were reported. I am of the opinion that we don't hear all the truth. The trials and difficulties are smothered and kept back, while the successes are shown. Dr. Farrar, with his complicated network of springs and pullies, has no failures. Dr. Talbot, with piano-wire springs, is equally successful. Dr. Kingsley, who ignores and condemns both, is all right; and Dr. Jackson, who apparently does all with split plates, speaks of but one single failure. But somehow or other in office practice we now and then see cases from the hands of able and prominent dentists which *are failures*, and occasionally *very bad ones*. Were it not for this, we would, after all we have lately seen and heard, feel disheartened, and be inclined to think that after a life-long practice we are yet in an embryonic state.

According to my own experience, the most important point on this subject is the control of the patient. Sometimes when a difficult case is well under way the parents' sympathy overcomes their judgment, and the child either does not put in an appearance, or comes with the apparatus in his pocket, where perhaps it has been for some time. Now, to guard against this and kindred evils, I know of no better way than to insist upon the payment of one-half the entire fee in advance. This is a dental retaining fee, and in the majority of cases gives wonderful control of the patient. This is a valuable rule, and it works well for both patient and dentist. A few patients may object at first, but when informed that the rule is enforced in every case they will give way, and in the end be better satisfied. I have just finished a difficult and tedious case,—that of a gentleman of position and prominence, over thirty years of age, whose superior teeth—with the exception of the two centrals—closed far inside the lower ones, giving a deep, squirrel-shaped arch, and leaving so little room for the tongue that articulation was materially interfered with. The teeth were very firm, and it did not seem as though it was possible to move them. But the patient was anxious and liberal, so the controlling or retaining fee of four hundred dollars was paid about one year ago, when the models were taken. The case was finished to-day, and I may safely add that both patient and operator are well pleased. Although this was one of the best patients in all respects, I am rather inclined to believe that at one time the case would have resulted in failure had it not been for the money anchor, which—thanks to its strength—held fast.

We know Dr. Kingsley is authority on this subject, and as he has lately done some good work in bringing to view the errors or sins of others, he ought to willingly bear a little rasping himself. It don't hurt him. Now, I do not intend to say he did not move that cuspid in the mouth of a patient thirty years old in seven days, but if he did he moved it about a quarter of an inch.

Dr. Kingsley. I don't think it was half that distance.

Dr. Clark. At any rate, it was pretty rapid work, and no doubt safe with Dr. Kingsley; but were I to attempt it devitalization of the pulp or something worse would be pretty sure to follow. In the case to which I referred a moment ago I could do nothing with the strongest piano-wire. It would not even start the teeth, and after many trials of similar appliances with little or no result jack-screws were used.

The President. I hope we may have the pleasure of seeing the models of this case at a future meeting.

Dr. Weld. I would like to ask the gentleman if he recieved his other four hundred dollars?

Dr. Clark. Most certainly. I have a check for it. If we would add a figure or two to our usual charges for some of these regulating cases we would not be overpaid. We rarely get paid for the time spent on them if the time is valued as for other operations.

Dr. Weld. I have listened very attentively to Dr. Jackson's paper, and I think we are under obligations to him, both for the paper and the exhibition of models. The appliances shown certainly reflect great credit upon him. Success in such operations is due, first, to the ingenuity and perseverance of the dentist, and secondly, as has been correctly observed, to the proper control of the patient. I think the measure of success in all these cases is about in proportion to those three conditions or requisites. Nevertheless, if Dr. Jackson were to read another paper and exhibit other models, say in two or three years from now, for each individual case he would have a different appliance. It simply bears out what Dr. Kingsley said, that there can be no one set of fixtures nor any one principle by which teeth can be regulated. In every individual case we find a different state of affairs, and we are obliged to adopt different appliances and different treatment, whether by the positive method or by the use of springs.

The President. Dr. Dwinelle can possibly tell us something about the old method of regulating teeth suddenly with the forceps. While on the subject of rapidity of movement, I may mention that I once threw the upper teeth outside of the lower ones in fourteen days, for a young lady twenty-eight years of age. As she was about to be married she lost no time in completing our operation.

Dr. Dwinelle. I have known Dr. John Allen, of this city, to regulate teeth for young children with the forceps. He had forceps made for the purpose. The alveolar process was broken up and the teeth regulated immediately. There was no destruction of the teeth or the parts, and no unhappy results followed.

I wish to say a word concerning the reference made by Dr. Clark



to getting, no matter how, the coöperation of the patient. He does it by making it for their pecuniary interest to coöperate. We all know how often we might have succeeded had it not been for the caprice of the patient or their parents or friends. If Dr. Clark has devised a method by which he can get the coöperation of his patients, I think he has made a large contribution to-night to dentistry.

Dentists are, and necessarily must be, an army of inventors from morning till night. I might almost say that we never do a thing twice in the same manner. We realize the force of the old adage that necessity is the mother of invention, and by stress of necessity we are constantly getting into corners and difficult places where we are stimulated and inspired, so to speak, to invent our way out by new devices.

Mr. President, I take great pleasure in introducing to you and to our society Dr. Adair, of Gainesville, Georgia. Dr. Adair is a graduate of the Baltimore College, class of 1874, I believe. He is engaged in developing the New South, a work with which we of the North heartily sympathize.

Dr. R. B. Adair. Mr. President and Gentlemen of the Odontological Society: It affords me great pleasure to have the honor and privilege of being present at one of your meetings. Although I came here to listen and learn, and not with the expectation of making any remarks, it has delighted me to be able to look upon the faces of men whom I have been following for twelve or fifteen years, and with whom the literature of our profession has made me somewhat acquainted. I started out about two months ago upon a tour of investigation, seeking information from all sources. I came from the Sunny South, as has been intimated; went around by the West, and I am now in the East seeking light.

Dr. J. Morgan Howe. I have been interested in the paper and models presented by Dr. Jackson, and feel like complimenting him on the success of his operations. He has attained success in these cases by a method which I have not ordinarily pursued. But results are what we look for, and Dr. Jackson has certainly presented excellent results. There is only one criticism that I would make, which is in the line of some remarks which I made at the last meeting,—that a fixture, especially one for retaining, is liable to injure the teeth when made of metal, and is in that condition of semi-contact with the teeth that all removable fixtures, such as shown, must be in. A little lack of cleanliness, which is almost certain to happen, will result in injury to underlying enamel, and I think this liability to injury is lessened when only non-metallic substances, non-conductors like vulcanite, are against the teeth; so I would question the propriety of such wire retaining fixtures as Dr. Jackson has shown.

Dr. Jackson. I am sorry that this subject has not been considered in a different manner. If, upon examination of the casts, any more practical method of accomplishing the same result in these cases had suggested itself to the gentlemen, it should have been stated. The best and most practical methods of regulating teeth are what we are seeking for. The majority of these patients are young, and it would be impossible to use a jack-screw in the mouth of a patient nine years old without meeting with a good deal of resistance on his part, and much trouble. None of my little patients hesitate to come at any time. The appliance I use is one of the most simple that I can conceive of for spreading the arch and regulating the teeth. Intermittent pressure has been referred to as analogous to the law of nature. The law of nature is that pressure and relief alternated cause hypertrophy, increased growth, hardening, and constant pressure causes atrophy or absorption. If you want absorption you must keep up a constant pressure without intermission or rest. We do want absorption in cases of regulating. Regulating has with me been made easy. I have no trouble with my patients, have never had one stay away because the fixtures hurt, and all my cases thus far have been carried to completion. I have used jack-screws, but do not now, for I do not want to make my patients so uncomfortable.

Dr. Clark. What would you do if you used the strongest piano-wire you could get, and yet could not start the tooth?

Dr. Jackson. I should certainly use two of them. Here are models of a case where I attempted to move a tooth with the ordinary screw in a plate, and I did not succeed. Then I put on a jack-screw, and that did not make the tooth move until it had driven three or four others out of place. The patient was about twenty-one years old. To-day, if I should be called upon to move a like tooth, I would not use a jack-screw. I should use piano-wire, placing a band about the tooth so shaped that the piano-wire would not slip off, and secure the band to the tooth with zinc-phosphate. Two or even four teeth can be moved in the same manner at the same time. Always apply the rubber dam, and after the band is placed as near the gum as desired with zinc-phosphate, draw down on the rubber to smooth the phosphate next to the gum. When the phosphate is hard, remove the rubber and trim away the excess. At some future time I will describe my method of carrying the incisors forward bodily without changing their angle.

Dr. Dwinelle. I think it is time for old Archimedes to hide his diminished head. He must have been mistaken when he counted upon the force of the screw. A screw is a continuous circular wedge or lever, and it is irresistible. When I made the discovery, many years ago, that zinc in conjunction with steel prevented it

from rusting, by reason of slow galvanic action, I said, "I will apply this to dentistry." The screw is the most powerful instrument known to mechanics. It is the universal testimony of everybody who has had any experience in such matters, excepting our worthy friend Dr. Jackson, that the jack-screw is also the easiest fixture that can be put into the mouth—that it causes less pain than any other. For a nine-year-old patient I would use a jack-screw from motives of humanity, if for no other. It is ridiculous to assume to limit the power of the jack-screw.

Dr. Atkinson. When I first saw Dr. Jackson I was pleased with him, and I am more pleased with him now than ever. I indorse the paper, the statements, and the deductions made on them as being exactly in the line of nature's laws; and I believe the heroic method of moving teeth is not a wise one. It is astonishing how much teeth may be moved by very light and constant traction; and he hit the keynote exactly when he said that continued pressure produces absorption. I am exceedingly pleased with what Dr. Jackson has presented, and I think he deserves the thanks of the society for it. He began with the coarse old methods, and has refined them until some of the small fixtures that he has shown are very neat and beautiful little appliances, just sufficient to hold the rubber or the springs that are to move the teeth. As to the half-round wire that he speaks of, I advised him to use it in certain cases because it gives a better grip on the tooth than round wire does; but he is right about the grip of the enamel; the round wire clasp has less contact with the enamel than the flat wire. I think we will get a great deal more benefit by just such evenings as this of interchange of opinion than by anyone's preachment about things they assume to know a great deal of. There are no two persons who require exactly the same treatment. I have moved teeth rapidly, and I have never but once moved a tooth that I was sorry for it, and that was a left superior lateral incisor, when I was in Cleveland. I moved it for the sake of getting room to fill and to carry it into line. I do not know to this day where my dereliction was, but I suspect there was a crooked end to the root of the tooth, and that by putting pressure on the unlucky side I choked the pulp until it died. That is the only case of bad result in moving teeth that I know of in my practice; and I do not remember of seeing any in the hands of other men. Where the remnant of the socket and the gum is in a soft and nodular condition after the teeth are in place, you need not fear bad results; it will come all right in time. When I found such a condition after operations in the treatment of what is now called Riggs's disease, I said, "You must not expect that the new alveolar process will be as nice as the original." But afterwards I



found that when the teeth were properly held in place the reproduced alveolar process would be as sharp and the dental ligament as snug as if they were original productions. Patience in such cases is all that is needed; nature will take care of it.

Dr. Jackson. Many regulating plates are bungling, and having to be tied in, cannot be removed by the patient for cleansing purposes, which makes them very unsatisfactory. Every one of the plates that I have shown here to-night has been of a variety that can be removed by the patient, cleansed and put back without trouble.

A vote of thanks to Dr. Jackson for his paper and the exhibition of his models and appliances was passed.

Adjourned.

S. E. DAVENPORT, D.D.S., M.D.S.,  
*Editor N. Y. Odontological Society.*

## FIRST DISTRICT DENTAL SOCIETY, STATE OF NEW YORK.

THE First District Dental Society of the State of New York held a regular monthly meeting, Tuesday evening, March 1, 1887, in the rooms of The S. S. White Dental Manufacturing Co., Broadway and Thirty-second street.

The president, Dr. William Carr, in the chair.

Dr. W. H. Atkinson, of the Clinic Committee, reported as follows:

Mr. President and Gentlemen: A very interesting clinic was held at White's Ninth-street depot this afternoon, and considerable enthusiasm was displayed by the eighty to one hundred dentists present . . . Dr. George W. Melotte, of Ithaca, N. Y., exhibited an improved compound blowpipe. It is very much simplified, and thereby the price much reduced. Dr. Melotte took pains to show its working qualities, and it was very much admired. He also showed two new forms of clamp forceps for soldering gold crowns or bands: one with a revolving cup-disk intended to allow the crown to be faced to the fire from any side, and it certainly accomplished its object satisfactorily. The same gentleman also showed a clamp forceps with flexible points, which was admirable for its purpose . . . Dr. S. C. G. Watkins, of Mont Clair, N. J., sought counsel for a regulating case, the patient being aged twelve years, and the model of which he presented. The superior fronts closed inside the inferior. It was suggested that the superior teeth be pulled forward and retained in position to await the development of the posterior teeth, with the expectation that the occlusion would become correct . . . Dr. J. M. Crowell, of New York, demonstrated the fusing of a body and gum upon single teeth by the use of the blowpipe and an alcohol-lamp. He also united two of Dr. E. Parmly Brown's bridge crowns with

the body to a bar, and then took one of Dr. Ryneear's gold crowns, covered it with the body, and fused it. Dr. Crowell showed great patience and shrewdness in replying to the numerous relevant and irrelevant questions put to him . . . Dr. Starr, of The S. S. White Company, demonstrated his method of lining rubber plates with gold, having a face of silver soldered to it, which he claimed vulcanization sulphurized so as to form a combining layer which is indestructible . . . Dr. Robinson, of Brooklyn, presented a case of superficial necrosis in a lady twenty-five years of age at side of left superior central, probably owing its origin to chronic alveolar abscess. He was advised to bur away all dead bone . . . Dr. Reese, of Brooklyn, showed a superior set on Reese base in the form of the old horse-shoe plates, which he had permanently attached to the roots of the cuspids and to two molars, constituting what might be called a fixed bridge, supplying the full upper set. This fixture had been doing good service for nineteen months . . . Dr. Morey, of New York, showed an improved trimming drill for root-canals . . . Dr. Mills, of New York, showed a regulating case in a lad fourteen years old in process of treatment, together with models from the beginning and during the progress of the case. The mouth indicated the present status, though incomplete. This was an interesting case, showing the necessity of combining different methods in many cases. A left superior lateral was placed behind the central and cuspid, and turned half around, resting on top of the inferior teeth when the mouth was closed, thus propping the jaws apart during the development of the molars, inducing an abnormal occlusion. Starting with a contracted arch, a Coffin plate corrected this; then with a bar plate constructed to open the occlusion, *à la* Atkinson, the irregularity of the anterior teeth was corrected, through the use of rubber rings, with the exception of the obstinate lateral, that being up to date only partially in place. That the occlusion can be corrected the superior and inferior molars, more particularly the inferior, are ground down from time to time with the expectation that the lateral will be forced out as the jaws close down, and also bring the bicuspid and cuspids together in proper occlusion . . . Dr. Melotte also exhibited a case of two bridges supporting five teeth. The abutments consisted of two cuspids banded, thereby avoiding cutting them off. The bands were formed with positive shoulders on the lingual surfaces, as described and illustrated in his article in the DENTAL COSMOS for December, 1886. The posterior abutments consisted of two sound molars banded, with cusps reproduced in gold, which is also described in the same article. The pieces have been in place ten months, showing satisfactory work, in healthy condition . . . Dr. W. Irving Thayer, of Brooklyn, exhibited his trip-

hammer plugger, which carries the same plugger or instrument as the electric plugger. The blow from this plugger is similar to that produced by the common hand-mallet, and by it gold may be very thoroughly condensed.

#### INCIDENTS OF OFFICE PRACTICE.

Dr. W. D. Tenison. Mr. President, I would like to report progress in the case of implantation the operation for which was performed by Dr. Younger in my office. I saw the case a week or ten days ago, and to all appearances it is in a very satisfactory condition; the tooth is firm and its color perfectly matches the other teeth in the mouth.

President Carr. Is it elongated?

Dr. Tenison. No, it is not. Shortly after the operation I made a plate to support the tooth, and it was worn for about two weeks. From that time to this it has not changed its position. I would say here that when Dr. Younger was making the incision in the gum, preparatory to drilling the socket, his instrument slipped and made a cut on the palatal surface of the gum. He proposed at the time to put a stitch or two in it, but the patient objecting, it was not done. The result is a little exposure of the palatal surface of the root of the tooth. With that exception, everything is in perfect condition. I have shown the case to several persons, from time to time, and in some instances they have not been able to detect the implanted tooth. I can see no reason why the case should not be pronounced, up to the present time, a perfect success.

President Carr. Gentlemen, we now invite your attention to an essay by Dr. George W. Melotte, of Ithaca, N. Y., on

#### CROWNS AND BRIDGE-WORK.

Dr. Melotte. To make the supplying of the partial loss of teeth by means of crowns and bridging a success, it is necessary that the teeth and roots used as anchorages should be in a clean and healthy condition before an attempt is made to use them.

The strength of the bands, caps, and other attachments must be in proportion to the length of the span. The greater the number of teeth to be supplied, the more important it is that there should be a sufficient number of sound teeth, and firm, healthy roots to form the abutments. The teeth and roots must be so prepared that the gold and other metals used can be closely fitted, and formed so that the force of the occluding teeth shall be distributed as equally as possible, giving an inward rather than an outward bearing. As imperfect occlusion resulting from the loss of even two or three of the



posterior teeth will sometimes disarrange and destroy the front teeth, so the imperfect adaptation of the articulating surfaces will result in entire destruction of pieces that in other respects (that of the perfect-fitting caps and bands) are faultless. In forming the dum-mies or teeth to be supplied, the porcelains must be protected by thick facings of gold, and, when joined one to the other, made strong enough to withstand the force used in masticating.

I will invite your attention to the construction of a piece of bridge-work. The case is one involving the loss of two bicuspid and a molar in the lower jaw. The anchorages are, first, a lateral root which has been properly treated and the nerve-canal filled. I would impress upon you the importance of the proper treatment of alveolar abscess, and the filling of nerve-canals, as it is the foundation of success in the supplying of single crowns on roots, and of greater importance when they are used as anchorages in bridging.

In this case the lateral root is to be used as one of the points of anchorage. What remained of the crown has been excised, and the end of the root has been prepared and trimmed so as to admit of a cap or band being formed around it. This cap is made of one solid piece of metal, platinum, or platinum with pure gold rolled on, which is better. It is burnished down around the root on the palatal side, just under the free margin of the gum; also, upon the lingual portion of the root which stands above the gum, and is so formed that it will pass down under the free margin of it. After enlarging the nerve-canal, the end of the root is made concave, and the platinum is burnished down into that groove. A hole is made through the platinum for the reception of the pin, which gives greater strength and a firmer hold of the cap upon the post or pin that goes down into the nerve-canal. As caps are usually made, that is conceded to be a weak point. If it was simply to carry its own crown, there would be no necessity for concaving the root at that point; but it being one of the abutments of the bridge, it is necessary to have a great amount of strength. After this platinum has been carried down and the pin put in, allowing it to extend flush with the adjoining surface of the root, gold solder is flowed in for the purpose of stiffening that portion of the cap and making it less liable to break.

The next abutment to be used in this case is a sound cuspid tooth. It might be cut off, but there are serious objections in the minds of many to cutting off sound teeth. But it can be done with safety if the nerve-canal is properly filled. To avoid this I have made, I think, an improvement in the matter of banding a tooth. I first straighten the mesial and distal surfaces to admit of fitting the band closely under the free margin of the gum. On the labial portion of the tooth the band can be made to fit without making any material

change. The band upon the mesial and distal surfaces is trimmed off so that it will fit the contour of the gum and pass down about one-half a line under its free margin, and by beveling the edges of the band this can be done without producing any great amount of irritation, or even bleeding.

After the band has been fitted, the point of improvement is that of grinding down the lingual surface of the tooth to a proper extent so as to form a positive shoulder, leaving the band quite narrow at this point,—just enough to hold it together; and then a piece of platinum of sufficient width to pass down upon the mesial and distal surfaces of the tooth is provided, sufficient in length to reach to the cutting edge or point of the cusp. The band having been removed, this piece of platinum is tacked on with a slight amount of solder. After attaching this to the band upon the lingual portion of the tooth, the band is replaced upon the tooth. The platinum used is about No. 30 or 32, and is bent back so as not to impinge upon that portion of the tooth.

After the band is in place upon the tooth it is then burnished on its general surface and around upon its mesial and distal surfaces, and the band is removed, being careful not to bend or displace it in any way. This piece of platinum is soldered on to the edge of this gold band. The gold used in making these bands ought to be about No. 27 or 28 gauge; and instead of using 22-carat gold, or even coin gold, it would be better to have it alloyed with a small quantity of platinum. This makes it harder to work, but the bands can be made to fit closely with gold that is quite hard; not equal to ordinary clasp metal, but harder than coin gold.

After the band has been soldered as described, it is then replaced upon the tooth and again burnished down upon its lingual surface. After that it is again removed, using great care the second time that the edges of the platinum are not bent or changed in shape. After removing it, fill the cap with investment, plaster of Paris and sand or marble dust; then flow on sufficient gold to form an occluding surface and give strength to the band. If the points of this band are allowed to extend up to the cutting edge, to the point where the cusp begins to taper, it will give greater strength.

Here is a cuspid where there is a little variation in the form of the band. This represents an abraded tooth. The only change that is necessary in this case, to restore the end of it so as to give the same appearance that it would have when built up with gold foil, is to have this platinum long enough to extend over the cutting edge, where it is burnished down. This leaves a mark on the platinum, so that the band can be trimmed up till it extends a half line beyond the edge or general surface of the tooth.

The next thing to be done is to take a piece of gold, in thickness equal to the amount to be restored, and then, after the band is removed and invested very carefully, this piece of gold is placed upon the platinum and waxed to it; allowing the wax to run through to prevent the investment from getting between the platinum and the gold, and letting the investment extend over on to this piece of gold to hold it in place; then with a blowpipe flow on sufficient gold to unite the piece that is to form the cutting edge of the tooth, and it is ready to be finished up. It makes a tooth which in appearance is excellent, with a very strong band and anchorage for a bridge. Having prepared this lateral root and attached a porcelain front to it, then take an impression in plaster of the lateral crown and the cuspid with its band; afterwards remove the band and the tooth, unless they come away with the impression, and put them in place and wax them; then fill the bands with plaster of Paris and sand, two-thirds of the former and one-third of the latter. I would then unite this cap, porcelain face, and band. That would enable me to test the work at this point. If there was any trouble from undue care, or if there had been any neglect in getting the band properly placed, it would show itself here, and could be corrected.

Having secured these two abutments, we pass to the third, which is a sound molar. In order to make a collar to fit closely down under the free margin of the gum, it will be necessary to straighten with corundum-disks the distal surface. I then grind off the buccal, palatal, and mesial surfaces. The tooth is now ready for the fitting of the band or collar. It is unnecessary for me to dwell upon the method of fitting a collar or band around a tooth, but it is fitted so that it will follow the line of contour of the gum and pass under its free margin. The band is now formed and trimmed so that it just exposes the cusps of the tooth, which show just above the band. The next thing to be done is to trim the tooth wherever the occluding surface of the antagonizing tooth comes in contact with it, reducing it sufficiently to admit the proper thickness of the gold cap that is to be made. Next, take an impression of the end of this tooth, in order to swage a cap that will exactly fit it. This impression may be taken with plaster of Paris, but I prefer to use the substance known as Moldine. A little cup is used in size sufficient to take in two or three teeth. The cup is filled with Moldine and the impression taken. I use a metal that fuses at about 212 degrees, and pour it into another ring inclosing the cup. Pour it as cold as it will run. When cold remove the cast with the ring containing it, and place it in a basin of cold water. When perfectly cold and wet, pour the counter-die. Great care must be used in



pouring the metal. The metal melts at so low a degree of heat that there is no danger in pouring on a wet cast. It is better that the cast should be wet, and the metal should be poured just when it begins to congeal, or at about the consistence of the metal solder used by plumbers when wiping a joint. In that way you avoid the sticking of the dies; but if they stick, another can be easily made. The same impression can be used many times, when care is taken in removing the die.

Next, take a piece of 21 or 22-carat gold, say No. 28 gauge, and swage it up; and if you have followed the directions closely you will have a cap that will fit accurately. Press it on the tooth and have the patient close the mouth, and you can ascertain whether the occlusion is right, and that there is room enough for the thickness of the gold that you have chosen for the cap. If you find that there is any point that needs to be reduced, you can reduce it, but as a rule, after tacking this cap on to the band, all that will be necessary will be for the patient to bite hard on it and it will swage down.

The next thing to be done is to hold this cap in place while it is being soldered. To save time, use a set of clamps that I have invented that will clasp the cap resting upon the collar in such a way as to hold it secure without the necessity of wiring it.

Should you desire to contour a tooth having this band and cap, there is a way of doing it that I have lately adopted, which is to run some wax around the top edge of the band, so that when you take an impression and swage the cap it will stand out a little and form a shelf on which to flow solder, allowing you to contour without difficulty. To more perfectly accomplish this I have devised a clamp, which is not yet in the market, but perhaps will be. It is a little disk, into which the crown may be placed, having a small spur that you can press down into the investment, or whatever substance you fill the crown with. The crown may be filled with Moldine, which will stand the heat, but care should be taken not to press the investment sufficient to have it run through between the cap and the collar. This cap having been completed and contoured, is placed in position, and it forms the third abutment of the bridge.

Next, having these points of anchorage in place, get a proper articulation. Press some wax upon the ridge, allowing it to come over the face of the tooth; then direct the patient to close the mouth. Carefully remove the wax and hold it up to the light, and you will see whether it is perfect, because it will be very thin at the occluding points. Place it in cold water to harden. If any considerable number of teeth in the upper jaw are perfect, take an impression in wax or modeling compound and get a cast of the upper

jaw. Having obtained such a cast, trim this wax away so that there are no points of impingement, and it will come down upon the ridge; then place these teeth into the pits in the wax made by the bite.

The caps having been placed in the impression, and a mixture of plaster of Paris and sand poured into them, this forms a model upon which to place the wax and make the articulation. The articulator is brought down, and it leaves its imprint upon the wax, or whatever substance you use. Carefully trim and form it into the shape to represent a bicuspid. Then take an impression with this same material, and strike up a gold cap and place it on the tooth; and if it is perfect it will come down perhaps over the porcelain, but it must be trimmed off flush with its edge; it must not be allowed to come over the edge of the porcelain, because the contraction of the model in soldering will be likely to break it. The surface of this tooth is covered with platinum. Platinum with pure gold rolled on is excellent, because if you want to preserve the color of a tooth it will be better to put a pure gold surface next to it. If you select one of the desired shade and then place platinum next to the porcelain, it will give it a grayish color, and the tooth will be found to be too dark. Where it is necessary to have quite a light shade of tooth, or one of a rich yellow cast, it can only be accomplished by putting a pure gold surface next to the porcelain, giving it the desired shade.

Having fitted this piece of platinum, which should extend in this way beyond the labial surfaces of the porcelain shell, and trimmed it to within perhaps one thirty-second of an inch of the edge, I then wax this swaged cap on to the platinum. Then it is invested and filled in with gold. This will give a perfect occluding surface. It is necessary that these facings should be covered with thick gold to prevent breaking. Having formed the dummies, join them to the abutments with wax, testing articulation; then invest, solder, smooth, polish, and the bridge is complete.

#### *Discussion.*

Dr. E. Parmly Brown. I do not want to see Dr. Melotte's paper passed without discussion. I would like to ask him why he leaves this space in his bridge-work between the lower part of the porcelain or gold crown and the gum or ridge of the jaw? I ask the question, Mr. President, because some dentists are present who witnessed a few weeks ago a case that I exhibited at my office, and here in the city also,—a case of bridge-work for a lady from Connecticut. The work was done by the Connecticut house, and replaced by the New York house. The bridge-work resembled this of Dr.

Melotte's exactly, and on two or three occasions when I examined the patient's mouth there was, it is no exaggeration to say, a large amount of swill moving around very loosely and recklessly in there. There are dentists here who saw it on several occasions. This lady afterwards had the bridge-piece cut out and some bridge-work applied by myself, with the new porcelain crowns, there being a very close and tight impingement of the bridge-piece upon the upper jaw; and everything is kept clean without any difficulty. I have a number of such cases in practice.

Dr. Melotte. Perhaps that space to which attention has been called by Dr. Brown is rather more exaggerated than it should be. I do not know of any objection to allowing the porcelain to just touch the gum; but the idea of leaving the space is to give an opportunity to cleanse thoroughly and prevent the lodgment of food. To have the porcelain or the gold touch the gum at any point there, it is necessary that it should present a rounded and flush surface, or else there will be hypertrophy of the gum and irritation, —often very serious results. The gum has a tendency to come over the bands and porcelain rather than to recede from them. But the idea is to leave a cleansing space there. I would not have it understood that in mounting anterior teeth I would leave a space in this way. In that case I should have the porcelain touch, or very nearly touch, the gum. But in case of posterior teeth, the bicusps and molars, it will do no harm to leave a space there. I have a piece in my own upper jaw, and there is such a space under it, and so far as any inconvenience is concerned I am not conscious of it.

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The society held its annual meeting on Tuesday evening, April 5, 1887, in the rooms of The S. S. White Dental Manufacturing Co., Broadway and Thirty-second street.

The president, Dr. William Carr, in the chair.

Dr. W. H. Atkinson, of the Clinic Committee, presented the following report of the afternoon's clinic, which was read by the secretary :

The attendance at the clinic was about eighty. Dr. W. W. Walker exhibited a new set of trephines and reamers for use in implanting teeth. They are an improvement on the set devised by Dr. W. J. Younger for the same purpose . . . The lining of rubber plates with gold was explained by Dr. E. T. Starr, with the aid of models, showing the process throughout. Dr. Starr also presented a beautiful upper and lower denture, mounted by Dr. H. W. Howe, of Lawrence, Kansas, which was a combination of 20-carat gold plate, the S. S. White pink rubber and countersunk-pin teeth. The



work was much admired . . . Dr. George Evans showed a new combination of cap, pin, and backing for porcelain crowns . . . Dr. J. M. Crowell exhibited some new muffles for baking body and gum with the mouth blowpipe . . . Dr. J. G. Morey showed a new die for striking up gold crowns . . . Dr. J. S. Latimer exhibited a model of a case of chemical and mechanical abrasion . . . Dr. A. R. Eaton, a case of separation of the incisors of the lower jaw at the median line; space three-eighths of an inch, with a protrusion of the upper front teeth. The first permanent molars were missing and the occlusion spoiled.

The remainder of the meeting was devoted to the reading of official yearly reports and to the election of officers for the ensuing year, which resulted as follows:

William Wallace Walker, president; J. F. P. Hodson, vice-president; Benj. C. Nash, secretary; Chas. W. Miller, treasurer; J. Bond Littig, librarian.

Delegates to the State Dental Society—John I. Hart and Meyer L. Rhein, each four years, and Chas. F. Ives to fill unexpired term.

The committees appointed are as follows: Executive Committee—Wm. Carr, C. E. Francis, and A. L. Northrop, chairman. Clinic Committee—C. S. W. Baldwin, A. R. Starr, and W. H. Atkinson, chairman.

Adjourned.

B. C. NASH, D.D.S., *Secretary*.

### ODONTOLOGICAL SOCIETY OF PENNSYLVANIA.

THE regular meeting of the Odontological Society of Pennsylvania was held Saturday evening, February 5, 1887, at the office of Dr. Guilford, No. 4006 Chestnut street, Philadelphia, President Register in the chair.

Dr. A. G. Bennett read a paper entitled "Crown and Bridge-Work."

[Dr. Bennett's paper will be found under the heading of "Original Communications," in this issue of the DENTAL COSMOS, page 349.—EDITOR.]

#### *Discussion.*

Dr. James Truman. My experience in this character of work does not warrant me in giving an opinion for or against bridge-work. The time since its introduction has been too short to determine its true position. It is quite certain that the many failures made by some of the supposed good workers in this direction must cause us to hesitate. It may be possible to place an entire denture on four supports, and Dr. Bennett may be entirely right in his reasons why

this form is really stronger than a partial case. The objections to its use were not, I think, clearly answered. The usual form, as now made, may be called self-cleansing; but is it? There are portions which will require considerable effort on the part of the wearer to keep clean. Tartar will accumulate, and how is this to be removed except by the dentist? The question of pericemental irritation and resorption must be met; but from my experience this is the one thing that skilled workers in this direction invariably pass over. That it has force must be apparent to every one who has watched carefully the development of this mode of artificial work for the past four years.

Dr. Bennett. Though Prof. Truman still insists that a band must irritate, I have never yet seen one which fitted at all that showed any sign of irritation. Theoretically some objections are strong, but practically they are weak; and this is a case in point. Most bands in a few days are covered by the gum, which looks healthy and natural. A band is certainly as non-irritating as a gold filling, and not half so liable to affect the gum as most fillings of amalgam. I do not refer to very wide or rough bands, forced against or into the gum-tissue. A sharp or rough body that *moves* is, of course, the worst of irritants; but a band is firmly fixed—immovable, with the edge beveled and finely polished. A theory cannot hold its ground against a fact.

I have had some experience in making crowns and bridges, and I think I can see their defects and limits. The weak part of a bridge is the front facings. These must be so attached that when broken off they can be readily replaced. A good plan is to grind down the sides and across the top a groove, into which thin gold or platinum is burnished, and then thickened with solder. Let large bridges alone until you are expert in making small ones. As I said, a narrow plate resting on the gum cannot be called a bridge. That may be a good method, but a bridge, to be such, must span the space.

Dr. Register. "The proof of the pudding is in the eating." While I cannot fully answer Dr. Truman in regard to the effects of the band upon the pericementum, in my experience, when properly done, the inflammation and even irritation is *nil*. If, however, the collar or ferrule be not positively placed, it becomes a constant source of irritation, from its movableness rendering it a favorable condition for the fermenting matters to lodge under. This is demonstrated by a simple ligature being tied around the tooth and being allowed to remain for a short period. When the ferrule and root are positively united, what little encroachment there may be upon the pericementum is demarcated without injury to the remaining

portion. A collar or ferrule is an essential feature of bridge-work. It should, in all cases where more than two teeth are employed, be used at one end of the bridge for anchorage. The other end can be dropped into a cavity or into the pulp-canal in cases so indicated; and it is in the imperfect adaptation of the abutments or anchorages that the foul accumulations are to be anticipated. If these be perfect, I am still inclined to adhere to the system of using a saddle stretching across the space just the width of the diameter of the crowns used, the crowns themselves being built up upon it. Dr. Bennett in his paper does not consider this bridge-work, nor did I so constitute it in 1881, in a paper read before this society, the term "bridge-work" having been given to this style of prosthesis since that time. Dr. Bing, of Paris, was the first in recent years to connect one or two teeth permanently in the mouth,—his method, however, as also that of more recent operators, differing from my own in the building up of the structure upon a saddle as described. If the anchorages are made perfect, this method will be self-cleansing, while capable of more strain of the muscles than that which spans the space without touching. To cleanse above the saddle, it is only necessary to run a threaded needle from one side to the other, and carry the thread backwards and forwards with the finger, and where atomization is used this will not be necessary.

I show you this evening the style of crowns I use in bridge-work. You will notice that the sides or approximating surfaces are formed into a dovetailed shape, the deepest part of the dovetail terminating just back of a little ledge towards the front, so that the faces of the teeth are not in any way marred in appearance. The dovetailed sides can contain one or more platinum pins, or can be used without any, depending alone upon the dovetailed box. When one or more of these are placed upon a bridge, they form for each tooth a dovetailed box, so that in case of accident a new crown can be slipped in and plugged into position without trouble, leaving it in as good and strong condition as when first made.

Dr. Guilford. I am especially pleased with the paper read by the essayist. We should look upon this matter of crown and bridge-work in its general aspect, and see what there is in it to approve or condemn, and not find fault with and speak only of certain of its minor features. Bridge-work is not a new thing, suddenly come upon us, in regard to which we are called upon to give opinion. It has been a development from the simplest original idea up to its present extensive proportions; a matter of slow growth; and we should examine and see whether its advancement step by step has not been the result of the necessities of the times. Half a century or more ago it was known that a natural root with an artificial crown



attached by means of a pivot or dowel was better in every way than an artificial tooth supported on a plate. Dr. Bing twenty years ago wondered why a tooth so useful when mounted on a natural crown should not also be able to be made useful when the root was lost, so he originated his plan of attaching a plate tooth to two adjoining natural teeth. Dr. Webb improved on this plan by arranging if possible to anchor one end of his wire in the root of an adjoining devitalized tooth, and building the opposite end into an approximal tooth-cavity with gold. About this time the hollow gold crown (wrongly called the Richmond crown) began to show forth its special merits, and attract attention on account of its firmness and solidity.

With a pivot tooth at one end of a toothless gap and a hollow gold crown at the other, it did not require very great ingenuity to devise the arranging of several artificial teeth between these two abutments, and the forming of a so-called bridge. True, the first attempts in this line were very crude and unsatisfactory, as they always are in the infancy of a great idea; but time has made great changes, and will make still greater ones in the near future.

Bridge-work as at present constructed has some objectionable features, but these should not blind us to its merits, and I have confidence enough in the ingenuity of the profession to believe that it will surmount all the present objectionable features and deficiencies. For my own part, looking upon it as a whole, I think I see many valuable features in it, which will make it, when modified and improved, one of the preferred methods of practice in the future. One of the chief objections urged against bridge-work by many was the fear of injurious results following the use of a collar around the necks of teeth. They had seen cases where the pericemental inflammation was so great that it would probably result in the loss of the roots or teeth, but they had probably not seen those other cases which many of us had, where a properly-shaped and nicely-adapted collar was serving its purpose without a trace of inflammation about it. Such work as I have seen coming from the Richmond-Sheffield establishment in New York was all wretchedly done, and was decidedly objectionable and injurious; but I have seen other work of the same general character properly done, and it was a delight to the wearer and a pleasure to look upon. Let us not condemn the system on account of its abuses, but let us rather use and if possible improve its better features.

Dr. Bonwill. In his paper read at the January meeting Dr. Essig referred to my method of crowning by the bolt and nut as retrograde. He considers the so-called Richmond crown with the band as superior, whether for a single crown, or more as in bridge-work. My

experience has been that bands do not strengthen the root unless applied separately from the crown and held in place by the cement that secures the pin. It must then be immovable. A cap with a band is best with the pin passing through it. It is only needed, however, in roots that are badly decayed, or a small superior lateral, or the inferior incisors. I believe my success has been equal to any in this work, and I have used the band as I advocate in but few instances. The great point is to anchor the pin deeply into the root, and level the periphery but little, using as large a pin as possible. Amalgam or oxyphosphate only should be relied upon,—not gutta-percha. The nut and bolt I abandoned for general use, not from the working loose of the nut, as Prof. Essig declares, but because my all-porcelain crown so nearly meets every necessity. Its simplicity, ease of adaptation, and low cost place it beyond all others. The nut and bolt must always stand as the representative of the first effort (1873) to secure the pin separately from the crown, and as the type of a true engineering principle, and will again come into use in bridge-work to enable it to be removed for repair. Long ago I explained how my crown could be converted into a crown like the so-called Logan by cementing one of my pins into it, and then inserting it into the root, with all the advantages of first fitting the crown to the root, and a much larger and stiffer pin than the platinum pin baked in, permitting it to be adjusted to meet any angle.

I am ready to adopt bridge-work when I can feel assured of its cleanliness and security, with a means of removal for repair. I feel that as now done by the average operator it will result in discomfiture and disgust. It is for the rich only. The operator who will succeed with it must keep well abreast of mechanical dentistry and make it a specialty. So much of the details have to be done in the office, that one can become expert at it only by long familiarity. If dentists would only give their attention to the proper adjustment of gold and rubber plates, with such articulation as I know can be done, they would have little need for this very uncertain method. It is too expensive for the medium class of patients.

Thus far I have had but few opportunities for its application beyond four teeth on one bridge, and I do not intend, so long as I can use amalgam and a crown, that such necessity shall come.

Were I compelled to adopt plate teeth soldered, I would not attempt this work. Wherever a backing is placed on a tooth it can never be kept clean except by boiling in soda; hence, some other plan must be adopted. Plates of all kinds have to be boiled in soda at least once a week. What, then, must be the condition of a plate fixed permanently in the mouth? See how filthy human teeth are

when extracted, and how the plates even of refined women become incrustated with secretions, and even with salivary calculus! Aside from all this, every conscientious operator knows that every set of four teeth or more should be temporarily arranged before soldering or vulcanizing to correct appearance of artificiality. This cannot well be done in bridge-work. As the grinding and cutting surfaces of the teeth are all covered with gold for protection, fine articulating cannot be done. All the cases I have seen are inartistic.

Before bridge-work can be so made as to overcome these objections, the teeth should be placed on a plate or bridge of iridium,—with pins soldered thereon for crowns similar to the all-porcelain,—and cemented, without a joint anywhere. They can then be replaced as easily as a crown on a root and be kept equally sweet.

I hope soon to show you a plan which I am developing to prevent the mutilation of natural crowns by capping, by a new method of clasps, with narrow plates resting on the gums, which admit of removal at any time by the patient. When natural roots are relied upon to support the bridge above the gums the plate should rest thereon, which will insure less strain upon the natural teeth. The new method of clasps will insure against decay and allow of a plate as narrow as any bridge-work; not resting at all upon the gums. This can be made by anyone of ordinary ability.

If more skill were displayed in the treatment of roots when the pulp is first extracted, and also in abscessed cases, crowns could be substituted to any number, with gold, amalgam, oxyphosphate, and gutta-percha; and by early, close, and frequent explorations of the teeth, there would be but little occasion to resort to bridges. If dentists will adopt my plan of articulation there will be but little trouble arising from the fitting of plates. A good plaster impression, a chamber properly centered,—shallow and small, with articulation perfect,—and there will be no need of bridges, which can only partially succeed even in the hands of the most skillful.

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#### FIFTH DISTRICT DENTAL SOCIETY, STATE OF NEW YORK.

THE Fifth District Dental Society of the State of New York held its nineteenth annual meeting at Utica, N. Y., April 12 and 13, 1887.

The following officers were elected for the ensuing year: C. H. Bennett, president; B. T. Mason, vice-president; C. J. Peters, recording secretary; G. H. Butler, correspondent; A. R. Cook, treasurer; A. Retter, librarian. Three new members were received.

C. J. PETERS, *Secretary*, Syracuse, N. Y.



**SOUTH CAROLINA STATE DENTAL ASSOCIATION.**

THE seventeenth annual meeting of the South Carolina State Dental Association was held at Charleston, S. C., commencing Wednesday, April 27, 1887, the sessions continuing for three days.

The following officers were elected for the ensuing year: L. S. Wolf, president; J. H. E. Millhouse, first vice-president; B. Rutledge, second vice-president; E. C. Ridgell, corresponding secretary; R. Atmar Smith, recording secretary; G. W. Dick, treasurer. Dr. B. H. Teague was elected to fill the vacancy in the Board of Dental Examiners.

The next annual meeting will be held at Greenville, commencing on the third Tuesday of July, 1888.

R. ATMAR SMITH, *Recording Secretary*,  
Charleston, S. C.

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**UNIVERSITY OF PENNSYLVANIA—DENTAL ALUMNI.**

THE seventh annual meeting of the Dental Alumni Society of the University of Pennsylvania was held in the main building of the University, Philadelphia, Pa., May 2, 1887.

The meeting was called to order at 4.30 P.M., by the vice-president, Dr. John A. Schmidt, of Ilion, N. Y. A large number of the old members were present, and twenty-two new names were added to the list of membership.

The officers elected for the ensuing year are as follows:

H. C. McClure, president; John A. Schmidt, first vice-president; Grafton Munroe, second vice-president; B. F. Place, third vice-president; J. P. Winner, recording secretary and treasurer; H. B. McFadden, corresponding secretary; Robt. M. Scott, orator; L. Foster Jack, J. R. Yorks, Ambler Tees, Jr., W. L. Winner, and Victor S. Jones, executive committee.

J. P. WINNER, *Recording Secretary*,  
Wilmington, Del.

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**CONNECTICUT VALLEY DENTAL SOCIETY.**

THE next semi-annual meeting of the Connecticut Valley Dental Society will be held at Windsor Hotel, Montreal, Canada, July 19 to 22, inclusive, 1887.

The arrangements already made indicate that this will be an interesting and profitable meeting. Prof. G. V. Black, M.D., D.D.S., of Chicago, and Prof. Chas. Mayr, of Springfield, Mass., will be the guests of the society, and will present subjects of interest to the profession. Prof. R. R. Andrews, of Cambridge, will present an interesting paper with stereopticon illustrations. Many other interesting papers and clinics are also promised.

The time for the meeting was arranged with special reference to its being the vacation season. There will be but one session of the society each day, and that in the morning. The afternoons and evenings will be devoted to excursions, social pleasures, etc. The profession in Montreal will do all in their power to make our visit to their city a pleasant one, and opportunity will be afforded to visit the various points of interest in and about the city, including a sail down the Lachine Rapids. Excursions at reduced rates will be arranged to Quebec, Montmorency Falls, and to the Saguenay; also to Ottawa.

A cordial invitation is extended to the profession, and a special request is made that each one *bring his wife with him*. To those attending the meeting, the rates at the Windsor will be reduced to \$3.00 and \$3.50 per day. Round trip tickets, good for two weeks, over the Connecticut River Railroad, as follows: Springfield, \$12.00; Northampton and Greenfield, \$11.50; Brattleboro, \$11.00; and Bellows Falls, \$10.00. We hope to announce reduced rates from other points, including Boston and New York.

All who intend going are requested to notify the secretary.

GEO. A. MAXFIELD, D.D.S., *Secretary*,  
Holyoke, Mass.

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#### PENNSYLVANIA DENTAL SOCIETY AND BOARD OF EXAMINERS.

THE nineteenth annual meeting of the Pennsylvania State Dental Society will be held at Glen Summit, Luzerne county, Pa., commencing on the last Tuesday of July, 1887.

W. H. FUNDENBURG, *Corresponding Secretary*,  
958 Penn avenue, Pittsburg, Pa.

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The Pennsylvania State Dental Examining Board will meet for the transaction of business at the Glen Summit House, Glen Summit, Pa., on the Lehigh Valley Railroad, on Tuesday, July 26, 1887.

Candidates for examination may give notice to the secretary or president of the board, at that time and place, or by correspondence.

W. E. MAGILL, *President*, Erie, Pa.

J. C. GREEN, *Secretary*, West Chester, Pa.

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#### NEW HAMPSHIRE DENTAL SOCIETY.

THE eleventh annual meeting of the New Hampshire Dental Society will be held in Concord, Tuesday and Wednesday, June 21 and 22, 1887.

All dentists of the State are invited to attend. Prominent members of the profession from out of the State will be present.

E. B. DAVIS, *Secretary*, Concord, N. H.

## INDIANA STATE DENTAL ASSOCIATION.

THE twenty-ninth annual meeting of the Indiana State Dental Association will be held at Lake Maxinkuckee, commencing Tuesday, June 28, 1887, and continuing three days.

The profession are cordially invited to attend.

The State Board of Dental Examiners will also meet at the same time and place.

R. W. VAN VALZAH, *Secretary*,  
Terre Haute, Ind.

## UNIVERSITY OF PENNSYLVANIA—DEPARTMENT OF DENTISTRY.

THE eighth annual commencement of the Dental Department of the University of Pennsylvania was held, in connection with that of the Medical Department, at the American Academy of Music, Philadelphia, on Monday, May 2, 1887, at 11 o'clock A. M.

The valedictory address was delivered by William Goodell, M.D.

The number of matriculates for the session in the Dental Department was one hundred and eleven.

The degree of D.D.S. was conferred on the following graduates by William Pepper, M.D., LL.D., provost of the university:

NAME.	STATE.	NAME.	STATE.
F. W. Amend, Jr.....	Pennsylvania.	W. L. Jones, Jr.....	Pennsylvania.
Wm. Frank Arnold.....	New York.	Milton N. Keim.....	Pennsylvania.
M. H. Bentzen.....	Norway.	James A. Milliken....	Pennsylvania.
Henry W. Bohn.....	Pennsylvania.	John F. O'Malley....	Pennsylvania.
C. A. E. Codman.....	Pennsylvania.	Chas. W. Outcault....	Ohio.
Oliver D. Darrell.....	Dist. of Columbia.	S. A. Pancoast.....	Ohio.
Fay H. Deming.....	Vermont.	Alfred Paxton.....	Pennsylvania.
F. J. Despecher.....	France.	Ralph G. Payne.....	New York.
R. Peel Doherty.....	New Brunswick.	E. A. Pérez.....	Ecuador.
T. J. Dunn.....	Pennsylvania.	Milton Powell.....	Pennsylvania.
Walter V. Elliott.....	Pennsylvania.	William F. Rehfuß....	Pennsylvania.
E. Fernandez y Lombard..	Cuba.	Howard S. Seip.....	Pennsylvania.
Theodor Frick.....	Switzerland.	R. H. D. Swing.....	Pennsylvania.
D. B. Fuller, Jr.....	Pennsylvania.	Ambler Tees, Jr.....	Pennsylvania.
A. F. Garesche.....	Cuba.	W. J. Turner, M.D....	New York.
J. T. Hammond, Jr.....	Pennsylvania.	Orandus H. Uhler....	Pennsylvania.
Issac W. Herbein.....	Pennsylvania.	Richard J. Wall.....	Pennsylvania.
William W. Hill.....	Georgia.	Joseph W. White.....	Pennsylvania.
John B. Howe.....	New York.	F. A. deZayas.....	Cuba.
W. H. Johnson.....	Pennsylvania.		

## NATIONAL UNIVERSITY—DENTAL DEPARTMENT.

THE annual commencement of the Dental Department of the National University was held, in connection with that of the Medical Department, at the Congregational Church, Washington, D. C., on Tuesday evening, May 3, 1887.

The valedictory address was delivered by John A. Daly, D.D.S., and the address to the graduating class by Prof. Samuel S. Adams, A.M., M.D.



The degree of D.D.S. was conferred on the following graduates of the dental class :

NAME.	STATE.	NAME.	STATE.
Harris C. Carroll.....	Pennsylvania.	William M. Hunt.....	Dist. of Col.
John A. Daly.....	Dist. of Col.	Jacob S. Manners.....	New Jersey.
John A. Drawbaugh.....	Pennsylvania.	Millen F. Phillips.....	Pennsylvania.

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## EDITORIAL.

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### DENTAL SECTION OF THE INTERNATIONAL MEDICAL CONGRESS.

As our readers have been heretofore advised, the Ninth International Medical Congress will convene at Washington, D. C., September 5, 1887. We are requested by Dr. Frank Abbott, of New York, who is one of the vice-presidents and a member of the Committee on Operative Dentistry and Oral Surgery and Clinics, to state that the "Arlington" has been selected as the headquarters of the Section on Dental and Oral Surgery; that the terms will be three and four dollars a day for each person, according to the floor selected, and that an early application for rooms should be made.

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### AMERICAN DENTAL ASSOCIATION.

THE following communication is of such general interest to the profession, which has been led to believe that the meeting of the American Dental Association would be postponed till next year, that its publication seems called for :

CHICAGO, Ill., May 6, 1887.

*Dr. Geo. H. Cushing, Recording Secretary American Dental Association :*

DEAR SIR: Your letter of April 30, accompanied with a copy of a communication from Drs. W. C. Barrett and Frank Abbott, making a protest against a proposed action of the officers of the association looking to the postponement of the regular annual meeting of the American Dental Association of the present year until 1888, and raising what they term a "point of order" as to the power of the officers under the constitution to do so; also, your letter of more recent date, with a statement of the vote upon the question submitted to the officers of the association, are received.

As the question raised had not occurred to me before, and the existing circumstances are of more than ordinary importance, I have thought it best to take such time to consider the subject as would enable me to reach a correct conclusion as to the power of the officers to change the time and place of the association's annual meeting; hence the delay in my reply.

It should be noticed that the gentlemen do not question the power of the officers to change the time and place of the meeting, provided the time is fixed within the year 1887.

The authority that the officers have (if such authority exists) to postpone the next annual meeting to 1888 is found in Section two (2) of Article four (4) of

the constitution. So much of the article as in any way governs the question, and to which reference is made by the protestants, reads as follows :

"*Time of Meetings.*—The regular meetings of the association shall be held annually, and commence on the first Tuesday in August. The place of meeting shall be determined each year by vote of the association.

"Section 2. The officers may, for extraordinary reasons, change the time and place of meeting upon the written consent of ten (10) of the fifteen (15) officers."

As Drs. Barrett and Abbott are not officers of the association, and have no right to vote upon the question at issue, or upon an appeal from any decision made, I could not see clearly how they could raise a point of order. The question, it seemed to me (for the time being at least), was a matter that rested entirely with the officers of the association.

The point they raise is valuable, however, as it has suggested a more thoughtful consideration of the question as to whether the officers have the power to *omit* a regular annual meeting of the association, for if the regular meeting for this year is postponed until 1888, the meeting of 1887 or that of 1888 would, of necessity, have to be omitted.

Upon a careful reading of the article referred to, I became satisfied that an honest construction of its meaning forbade the officers postponing the meeting until next year. But before giving this as my decision, I felt that I should take counsel with some one in whose opinion the association could rest with assured confidence.

With this idea in view, I placed the constitution of the association and the protests of Drs. Barrett and Abbott in the hands of Ex-United States Senator Lyman Trumbull, and asked him to give me his written opinion upon the entire subject, which will be found in the following copy of a letter received from him :

CHICAGO, May 4, 1887.

Dr. W. W. Allport, President American Dental Association, Argyle Building, City :

DEAR SIR : The authority of the officers of the American Dental Association to dispense with the annual meeting is one of power under the constitution, and not a question of order as to the course of proceeding, which could only be raised by a member of the association in one of its meetings.

In my opinion, a fair construction of Article 4 of the association's constitution requires regular meetings of the association to be held annually. While Section 2 of that Article authorizes the officers, for extraordinary reasons, to change the time and place of meeting upon the written consent of ten of the fifteen officers, I do not think it contemplated a repeal of the first section, which requires annual meetings to be held; but was intended rather to authorize a change of the time and place of holding the annual meeting. My conclusion is that the officers would not be authorized under the constitution to dispense altogether with the annual meeting.

Yours truly,

LYMAN TRUMBULL.

With the opinion of a gentleman of such large experience in and accurate knowledge of parliamentary proceedings, and acknowledged standing as an able constitutional lawyer, I must accept his interpretation, and decide that the officers of the association have no power to *omit* an annual meeting, and therefore direct that the vote just taken be not recorded.

Very truly yours,

W. W. ALLPORT, President.

### CONNECTICUT DENTAL LAW.

FOLLOWING we give the text of "an act to regulate the practice of dentistry in the State of Connecticut," recently passed by the Legislature of that State, and which was signed by the Governor on the 4th of April, 1887, and became a law :

*Be it enacted by the Senate and House of Representatives of the State of Connecticut in General Assembly convened:*

SECTION 1. It shall be unlawful for any person who is not at the time of the passage of this act engaged in the practice of dentistry in this State to commence such practice unless such person shall have received a diploma from the faculty of some dental college, duly authorized by the laws of this or some foreign country, in which college there was delivered annually, at the time said diploma was granted, a full course of lectures and instructions on dentistry, or shall have had eighteen months' pupilage in a dental office, and in addition thereto shall have attended one full course of lectures in some such college as specified above; or, in case of removal from another State or country, shall have received a certificate from some lawful board of dental examiners, or have had six years' regular dental practice; *provided*, that nothing in this act shall interfere with physicians in the discharge of their professional duties; and further *provided*, that this act shall not apply to any student studying or practicing in the office of any dentist in this State.

SEC. 2. Any person who shall violate the provisions of this act shall be deemed guilty of a misdemeanor, and upon conviction thereof shall be fined not less than fifty nor more than two hundred dollars for each offense.

### MASSACHUSETTS DENTAL LAW.

FOLLOWING is the text of "an act to establish a board of registration in dentistry" for the Commonwealth of Massachusetts, which received the signature of Governor Ames, April 1, 1887, and became a law:

*Be it enacted by the Senate and House of Representatives in General Court assembled, and by the authority of the same, as follows:*

SECTION 1. The Governor of the Commonwealth, with the advice and consent of the Council, shall appoint, after the passage of this act, five skilled dentists of good repute, residing and doing business within the Commonwealth, who shall constitute a board of registration in dentistry; but no person shall be eligible to serve on said board unless he or she shall have been regularly graduated from some reputable medical or dental college duly authorized to grant degrees in dentistry, or shall have been engaged in the practice of dentistry for a period of not less than ten years previous to his appointment; *provided, however*, that no person shall be eligible to serve on said board who is in any way pecuniarily connected with any dental college or dental department of any college or university. The term for which the members of said board shall hold their office shall be three years, except that two of the members of the board, first to be appointed under this act, shall hold their office for the term of one year, two for the term of two years, and one for the term of three years, respectively, and until their successors shall be duly appointed and qualified. In case of a vacancy occurring in said board such vacancy shall be filled by the Governor in conformity with this section. Any member of said board may be removed from office for cause, by the Governor, with the advice and consent of the Council.

SEC. 2. Said board shall choose one of its members president, and one secretary thereof, and it shall meet at least twice in each year. Four of said board shall constitute a quorum, and the proceedings thereof shall, at all reasonable times, be open to public inspection.



SEC. 3. Within six months from the time this act takes effect it shall be the duty of every person who is at that time engaged in the practice of dentistry in this State to cause his or her name, residence, and place of business to be registered with said board, who shall keep a book for that purpose. The statements of every such person shall be verified under oath before a notary public or justice of the peace in such manner as may be prescribed by the board. Every person engaged in the practice of dentistry within this Commonwealth at the time of the passage of this act, and who shall so register with said board as a practitioner of dentistry, shall receive a certificate to that effect, and may continue to practice without incurring any of the liabilities or penalties provided in this act.

SEC. 4. All persons not provided for in section three may appear before said board at any of its regular meetings and be examined, either orally or by written examination, at the option of the several applicants, with reference to their knowledge and skill in dentistry and dental surgery; and if the examination of any such person or persons shall prove satisfactory to said board, the board shall issue to such persons as it finds to possess the requisite qualifications a certificate to that effect, in accordance with the provisions of this act. All certificates issued by said board shall be signed by its officers; and such certificates shall be *prima facie* evidence of the right of the holder to practice dentistry in Massachusetts.

SEC. 5. Any person who shall violate any of the provisions of this act shall be deemed guilty of a misdemeanor, and, upon conviction, may be fined not less than fifty nor more than one hundred dollars, or confined three months in the county jail, for each and every offense.

SEC. 6. The said board shall charge each person receiving a certificate the sum of fifty cents, and each person appearing before them for examination for a certificate of qualification a fee of ten dollars, which fee shall in no case be returned. Any person failing to pass a satisfactory examination shall be entitled to be re-examined at any future meeting of the board, free of charge, but no applicant shall be examined oftener than twice in one year. Said board shall make an annual report of its proceedings to the Governor, by the thirty-first day of December in each year. All fees received by the board under this act shall be paid by the secretary of the board into the treasury of the Commonwealth once in each month.

SEC. 7. The compensation, and all necessary expenses of the board, shall be paid from the treasury of the Commonwealth. The compensation of the board shall be five dollars each for every day actually spent in the discharge of their duties, and three cents per mile each way for necessary traveling expenses in attending the meetings of the board, but in no case shall any more be paid than was actually expended. Such compensation and expenses shall be approved by the board and sent to the auditor of the Commonwealth, who shall certify to the Governor and Council the amounts due as in case of all other bills and accounts approved by him under the provisions of law; *provided*, that the amount so paid shall not exceed the amount received by the treasurer and receiver-general of the Commonwealth from the board in fees as herein specified, and so much of said receipts as may be necessary is hereby appropriated for the compensation and expenses as aforesaid.

SEC. 8. Any person who shall falsely claim or pretend to have or hold a certificate of license, granted by any board organized under, and pursuant to, the provisions of this act, or who shall falsely, and with intent to deceive the public, claim or pretend to be a graduate from any incorporated dental college, or who shall practice dentistry without obtaining a certificate as provided in this act,

shall be deemed guilty of a misdemeanor, and shall be liable to the same penalty as provided in section five.

SEC. 9. Nothing in this act shall apply to any practicing physician who is a graduate from the medical department of any incorporated college.

SEC. 10. This act shall take effect upon its passage.

The following have been appointed by Governor Ames as members of the board: L. D. Shepard, D.M.D., of Boston, for three years; J. Searle Hurlbut, D.D.S., of Springfield, and E. V. McLeod, D.D.S., of New Bedford, for two years; George E. Mitchell, D.D.S., of Haverhill, and J. F. Dowsley, D.D.S., of Boston, for one year.

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## BIBLIOGRAPHICAL.

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A SYSTEM OF DENTAL SURGERY. By SIR JOHN TOMES, F.R.S., late dental surgeon to the Middlesex and Dental Hospitals, etc. Third Edition, revised and enlarged by CHARLES S. TOMES, M.A., F.R.S., late lecturer on dental anatomy and physiology to the Dental Hospital of London. With 292 illustrations. Philadelphia: P. Blakiston, Son & Co., 1887. Price, cloth, \$5.00

It is impracticable to give in a mere book notice a succinct view of the nearly eight hundred pages in this last edition of a work which has for years served as a text-book in dental colleges, and has won for its author a large place in the respect and esteem of the dental profession. The reader of the volume has, however, no clue to the parts written respectively by author and editor, and to discriminate by reference to the previous editions involves an unprofitable expenditure of time and labor. At a glance there is an apparent disproportion of phenomenal to practical matter, and the discursive, not to say discursive, treatment of some subjects leads us to query if the editor had sufficiently kept in mind the original design of the author, "to produce within the limits of a manual a strictly practical work on dental surgery." In view, furthermore, of the fact that the work is designed mainly to impart the results of the observations and labors of its distinguished author, supplemented by those of his son, we cannot avoid the conclusion that the book is not comprehensive enough to be properly termed a "System," and is obviously wanting in the conciseness and compactness desirable for a manual. These remarks apply to the work as a whole, but considered in detail we should require much space for the commendatory criticisms which many of its monographs would justify.

Dental histology is undergoing fresh and careful investigations in the light of improved instruments and methods, and new theories confront the old, which are yet defended with vigor and ability.

The original researches and observations in this field by the author entitle his views to the general consideration they have hitherto received at the hands of histologists, and no student can properly complete his course of study without familiarity with the work of Mr. Tomes relative to both the normal and abnormal development of the human teeth. His description and treatment of dental irregularities are of especial value to the practitioner who would have at his command all such practical additions to the resources of his art. We believe that the volume might be profitably purchased and perused by every member of the dental profession.

REPORT OF THE COMMISSIONER OF EDUCATION for the year 1884-85.  
Washington: Government Printing Office, 1886.

We have received a copy of this bulky volume, which contains abstracts of the official reports of the school officers of States, Territories, and cities, 325 pages, and statistical tables relating to education in the United States, 511 pages. These, with the Commissioner's report proper, 317 pages, make up a volume of 1153 pages, to which is added an index. Its contents cannot be adequately epitomized in a short notice. The vast amount of information thus collected into permanent form cannot fail to be of practical interest and value to all who are directly or indirectly engaged in the work of education. This is the fifteenth and last annual report of Commissioner Eaton, who resigned and was relieved of the duties of his office in August, 1886.

#### PAMPHLETS RECEIVED.

Report of the Board of Dental Examiners of the State of California. Sacramento: James J. Ayers, State Office, 1886.

Transactions of the New Jersey State Dental Society for the Years 1884-5-6. Compiled from Stenographic Notes. 203 pp. Newark, N. J.: The "Advertiser" Printing House, 1886.

Proceedings and Constitution and By-Laws of the Arkansas State Dental Association, adopted January 11, 1887. Published by authority. Eureka Springs: Henry A. Cook, 1887.

Circulars of Information of the Bureau of Education, No. 2, 1886: Proceedings of the Department of Superintendence of the National Educational Association at its meeting at Washington, February 23-26, 1886. Washington: Government Printing Office, 1887.

Courtesy among Dentists at Professional Meetings. Annual Oration delivered before the American Academy of Dental Science, Boston, Mass., November 10, 1886. By J. N. Farrar, M. D., D. D. S., New York City. Reprinted from the "Independent Practitioner" of February, 1887. By order of the Society.



## OBITUARY.

### DR. WILLIAM C. EASTLACK.

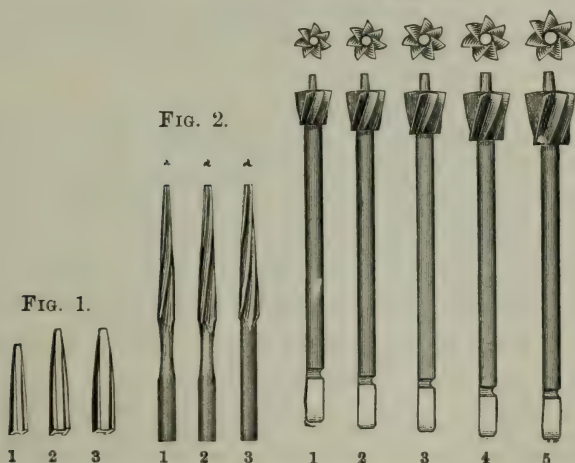
DIED, at Tokio, Japan, February 26, 1887, of an affection of the liver, WILLIAM C. EASTLACK, D.D.S., in the fifty-second year of his age.

Dr. Eastlack was born at Mantua, Gloucester county, N. J., March 25, 1835. He studied dentistry in Philadelphia with Dr. Elijah Neall. In 1860 he left a good and growing practice here to try his fortunes in China, engaging in his profession in Hong Kong, and afterwards at Shanghai. In 1868 he came home, but after a stay of a few months went back to the East. He returned again to Philadelphia in 1872, when he received the honorary degree of D.D.S. from the Ohio College of Dental Surgery. He soon left to practice for several years in Berlin, Germany, after which he returned to China, and thence to Japan, where he died, attended by his eldest son. His wife and younger son were in San Francisco on their way to him at the time of his decease. Two of his brothers from Shanghai were with him just previous to his death. Dr. Eastlack was of a genial disposition, and had many friends in the East. His mother, two brothers, one of whom is Dr. H. Y. Eastlack, and three sisters reside in Philadelphia.

## HINTS AND QUERIES.

ROOT-REAMERS AND TRIMMERS.—In the preparation of tooth-roots to receive crowns, and especially the Logan crowns, it is a matter of great importance that

FIG. 3.



the hole in the root should be of the same size and shape as the crown-pin. To this end I have devised some root-reamers which will enlarge the root-canals

to the exact sizes and tapers of the Logan crown-pins, Fig. 1, Nos. 1, 2, 3. The illustrations exhibit the peculiar forms of the reamers, which are numbered 1, 2 and 3, Fig. 2, to identify them with the corresponding numbers of the Logan crown-pins. In practice a straight hole is drilled to the measured depth that the root will permit, and that hole is then enlarged with the proper reamer to fit the pin of the Logan crown selected. The end of the reamer is smooth, and therefore will not act as a drill, but will cut only to the bottom of the drilled hole, or enlarged pulp-canal. A root-trimmer of the proper diameter, Fig. 3, is then used to face the root-end, which by that means may be cut smooth and slightly convex, to afford a suitable seat for the neck of the crown. The guide-pin of the reamer keeps it central on the root, and prevents the rotating cutter from running side-wise off the root, as instruments of the bur kind are apt to do. By the use of these reamers and trimmers the roots of all the oral teeth can be rapidly, smoothly, and accurately prepared for the reception of Logan Crowns, which with the least possible cement will be so supported by the actual contact of pin and crown with the root that the utmost degree of strength will be thus obtainable, in addition to a greater expectation of durability by reason of the close joining of the crown with the root. The reamers are made in five sizes, and can be sharpened when dulled by use.—B. A. R. OTTOLENGUI, M.D.S.

**COHESIVE GOLD AND HAND-BURNISHERS.**—Apropos of the talk about the Herbst method, while all have admitted that gold can be worked by burnishing, no one seems to have tried to any extent hand-instruments for this purpose. Gold works most beautifully under hand-burnishers. I use ball-point instruments of different size and angle of shank, and use round burs in preparing the cavity, so that the burnisher is adapted to its walls. One or two retaining-points should be made, and the gold used *without* annealing, except for surfacing, when hardness is desirable. No special gold is necessary. I have tried Wolrab's, but do not see any advantage in it. I am using the Globe semi-cohesive foil in the form of cylinders (Pack's) and as folded ribbons. I tried the Herbst method by rotary burnishing, and satisfied myself of two things,—that good fillings could be made by it, and that the engine was a nuisance. I am decidedly opposed to any method of manipulating gold that necessitates an engine accompaniment. I want more liberty of movement, and don't believe in sacrificing tooth-substance to method.—A. MORSMAN.

**MELLOTTE'S MOLDINE.**—I have found Moldine very useful in repairing gold, and silver-plate and bridge-work. The tooth or teeth and plate can be invested by molding the Moldine over and around the parts to be soldered, and the work at once heated up; thus saving much time and trouble usually resulting from the use of wet mixtures as investients. Impromptu crucibles for small melts of any kind can also be made of Moldine. A thick gold collar or ring, or cross-bar, or any small article, can be cast in a Moldine mold, which is easily and quickly formed from a suitable model, and is ready for use as soon as made.—F. B.

**CHANGES IN TOOTH-FORM.**—Professor Windle reports to the British Dental Association the conclusions arrived at by him that man's original dentition included six incisors in either jaw; that two from each jaw have gradually disappeared, owing to the contraction of the anterior part of the palate, which contraction he thinks will continue, involving the loss of two more incisors. He claims that the conical shape of most supernumerary teeth indicates a reversion to the primitive type of tooth.—W. R. P.

THE

# DENTAL COSMOS.

VOL. XXIX.

PHILADELPHIA, JULY, 1887.

No. 7.

## ORIGINAL COMMUNICATIONS.

THE SIGNIFICANCE OF THE NATURAL FORM AND ARRANGEMENT OF THE DENTAL ARCHES OF MAN, WITH A CONSIDERATION OF THE CHANGES WHICH OCCUR AS A RESULT OF THEIR ARTIFICIAL DERANGEMENT BY FILING OR BY THE EXTRACTION OF TEETH.

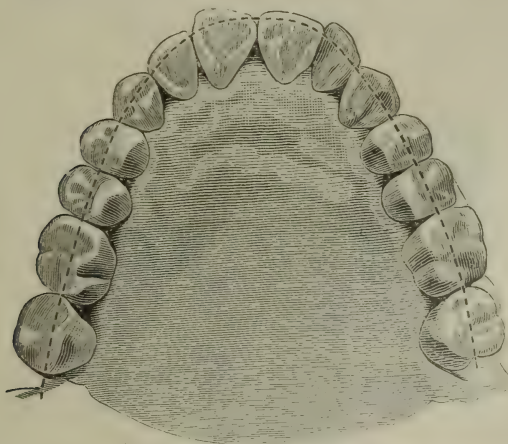
BY ISAAC B. DAVENPORT, M.D.S., M.D.,

39 Boul. Haussmann, Paris, France.

TO THE HONORABLE PRESIDENT AND GENTLEMEN OF THE NEW YORK ODONTOLOGICAL SOCIETY:

NATURE has furnished man with two dental arches, so formed and so placed in relation to each other as to be best supported at every

FIG. 1—A.



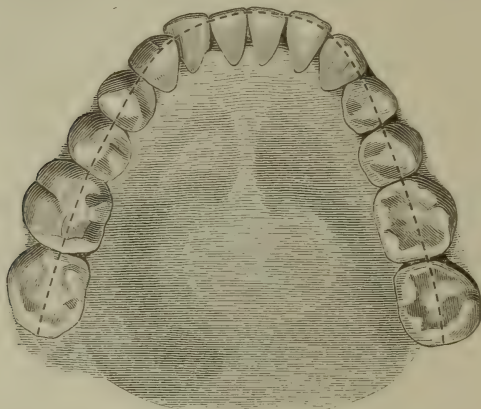
Superior Arch. Dotted line indicates normal line of contact between the teeth.

point, while permitting all the movements necessary for the perfect comminution of his food.



Each side of both arches, upper and lower, is furnished with its double row of molar cusps, so arranged that the outer, lower row works between the two upper rows, and the inner, upper row works in the irregular groove between the two lower rows.

FIG. 1—B.

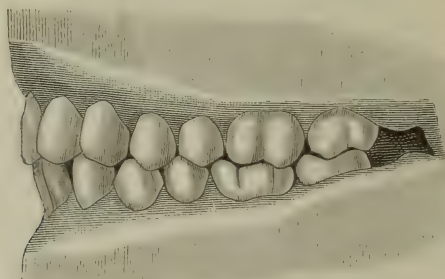


Inferior Arch.

The double cuspid arrangement ceases at the angle of the mouth, by the suppression of the inner row of cusps and the modification of the outer row into cutting-edges.

This suppression of cusps prevents an interlocking which would defeat the normal movements of mastication.

FIG. 1—C.

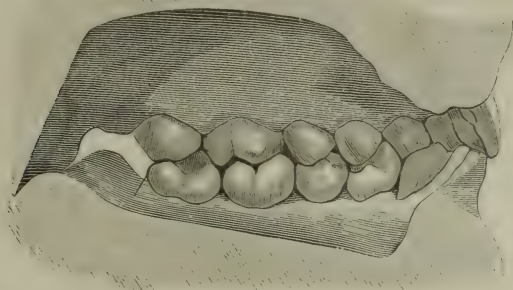


Exterior View of Articulation.

The upper incisors shut past the lower perhaps a little more than the height of the molar cusps. This permits of the cutting movements of the incisors without too much striking of the cusps. (See Figs. 1—C—D, and Fig. 8.)

When the teeth articulate well, the lateral arrangement of cusps and furrows permits the greatest freedom of motion with the least separation of the grinding surfaces. (See Fig. 2—I.)

FIG. 1—D.



Interior View of Articulation.

The palatal surfaces of incisors and cuspids are so directed, and have such relations to the inclines of the molar cusps, as to permit contact at different planes of the surfaces.

FIG. 2—I.

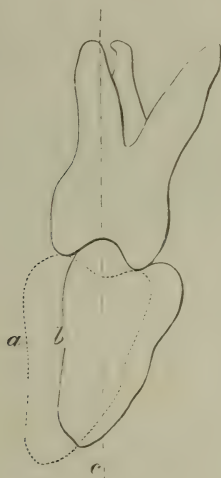


FIG. 2—I shows the normal inclination of the axes of the molars, and the normal relation of the cusps and furrows—i. e., the grinding surfaces.

FIG. 2—II.

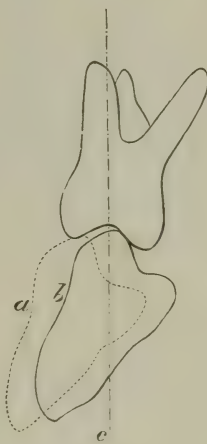
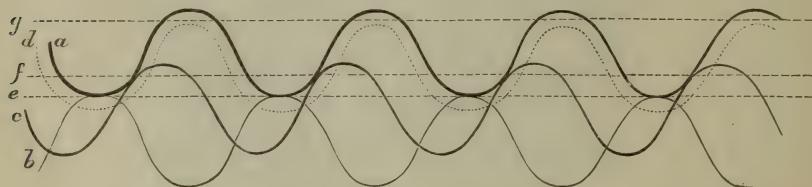


FIG. 2—II shows the increased inclination of the axes of the molars, and the separation of the inner cusps which occurs when the arches are broken and the teeth fallen inward.

To make myself clear upon this important matter of the general relation of the grinding surfaces of all the teeth, you are referred to Fig. 3, which is a diagram intended to represent the arrangement of the grinding surfaces of both arches.

The curved line *a* represents the grinding surfaces of one side of the superior arch with its cusps and depressions, and the dotted curved line *d* the corresponding grinding surfaces of the inferior arch, while the two are shown in such perfect relation to each other as to permit contact throughout their extent. Lines *a* and *b* indicate the relative position of both arches when the lower is forward,

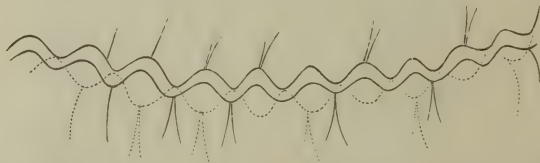
FIG. 3.



in the act of cutting, in which position the points of the cusps are just ready to strike. These several points of contact taken together—*i. e.*, when there is touching between the edges of the incisors and at the same time touching between the cusps of several or all the other teeth, as indicated by dotted line *e*—may be considered as the first plane of articulation.

As the lower jaw moves backward, all the points of contact are shifted by a sliding movement over the opposite grinding surfaces, until the apices of all the cusps rest at the bottom of the opposite concavities or furrows, as with *a* and *d*, and articulation is complete. Throughout this movement there has been contact between each section of the curved lines at corresponding points, and there are just as many planes of articulation as there are positions in which such general contact is possible. See dotted lines *e* and *f*, which connect respectively contact points between *a* and *b* and between *a* and *c*.

FIG. 4.

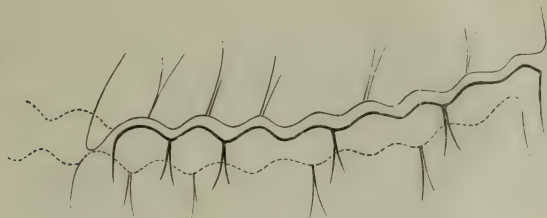


In Fig. 4 we have the same curved lines as in Fig. 3, adapted to the general form of the dental arches, with the teeth roughly outlined, and all of the articular planes of the two arches in perfect relation. The dotted lines indicate the position of the lower teeth on the first plane of articulation.



Fig. 5 is the same as Fig. 4, excepting that the first planes of articulation are out of relation, owing to an over-projection of the front teeth, so that contact of the molars is lost on all the first planes of

FIG. 5.



articulation. With such a condition mastication is effected principally by a chopping motion, with but a limited lateral and rotary movement.

FIG. 6.



Fig. 6 shows a *fortunate* result after extraction, for the general planes of articulation are not disturbed; only certain grinding surfaces have dropped out of position, and become useless in consequence of the downward tipping of the molars in their search of support for the arch.

FIG. 7.

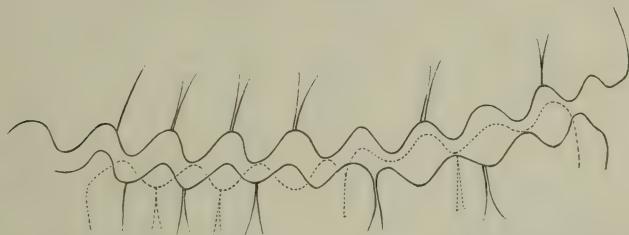
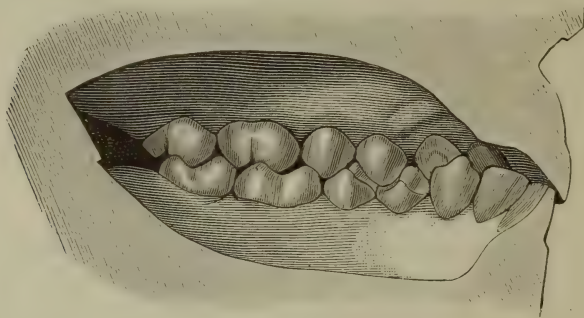


Fig. 7 shows the curved lines so much out of relation that there are *no* general planes of articulation. The striking of the points of the cusps of the second and third molars prevents what otherwise would be a *perfect* articulation of the bicusps and first molars, and *vice versa*. We sometimes find patients with this condition doing most of their eating with the front teeth, for otherwise mastication

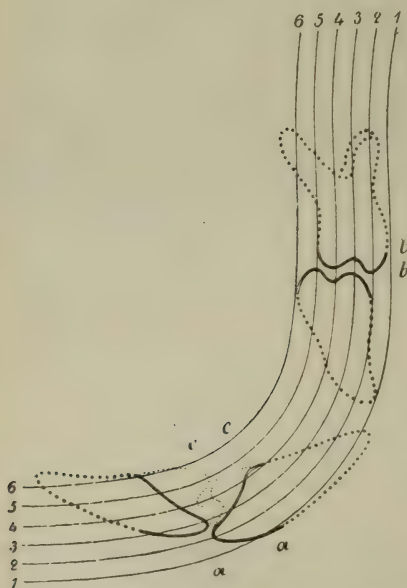
is merely a punching of the food upon perhaps not more than one-half of the first plane of articulation. A few prominent cusps strike and throw all the articulating surfaces out of gear. This result is very easily produced by the free use of the file.

FIG. 8.



In Figs. 4 and 5 the articulation is shown as it appears exteriorly, but that plan only allows one to see the outer row of cusps of the upper teeth projecting somewhat over the lower teeth, with the

FIG. 9.



points of the cusps directly opposite the divisions between the corresponding lower teeth. If all the four rows of cusps on one side were thus related to each other, there would be a tendency of the teeth to be forced apart by the wedge-shaped cusps driving into the opposite depressions, deepest at the points of division of the arches into separate teeth.

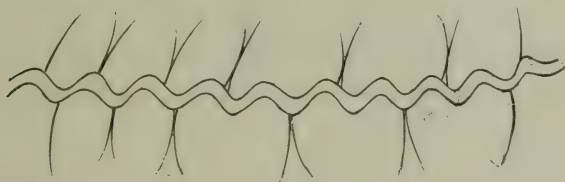
Fig. 8 illustrates a case of this sort, where the teeth, which in most other respects are superbly arranged and articulated, have been driven forward and apart, and the arches broken by the wedging articulation. As the continuity of the arches is normally preserved to a very great degree by the articulation, and as the manner of its preservation is of great practical importance to us, you are referred to Figs. 10 and 11, which represent vertical sections through both arches, on the lines 3 and 4 of Fig. 9.

As the continuity of the arches is normally preserved to a very great degree by the articulation, and as the manner of its preservation is of great practical importance to us, you are referred to Figs. 10 and 11, which represent vertical sections through both arches, on the lines 3 and 4 of Fig. 9.

Fig. 9 is a series of curved lines supposed to be drawn at the level of the articulation between the upper and lower teeth of one side of the mouth. On these lines are indicated the relative positions of the molar cusps and groove, *b b*, and also the relative positions of the edges of the incisors, *a a*. The roots of the teeth, in dotted outline, are supposed to project above or penetrate below the contact level. The small dotted lines, *c c*, indicate the outline of the suppressed inner cusps of incisors and cuspids.

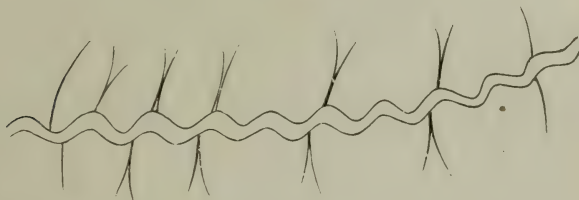
A vertical section of the two arches made upon the line 3—3 would pass through the bottom of the groove between the outer and inner cusps of the upper molars and bicuspid, and through the apices of the outer cusps of the lower molars, bicuspid, and cuspid, and the edges of the incisors, and would appear as in Fig. 10.

FIG. 10.



In Fig. 10 we see that the divisions of the *lower* arch into separate teeth begin at the *bottom of the curves*, just the same as do those represented by Figs. 4 and 5, but the divisions in the *upper* arch are at points on the curved line about *midway between the greatest depth of the concavities and the point of the cusps*. The evident effect of this arrangement is, that the outer cusp of the second lower bicuspid and

FIG. 11.



the anterior outer cusp of the lower molars strike beyond the division between the upper teeth, and into the little depression formed by the rim or ridge situated at the posterior border of the grinding surfaces of upper molars and bicuspid.

A section on the line 4 of Fig. 9 would give Fig. 11, where we have almost exactly a reversal of the same conditions described in Fig. 10. This double crossing of the lines of division of the arches by the articulating teeth, as indicated by Figs. 10 and 11, is in one effect to *bind the teeth into firmer contact* in the arch.



Finally, the general arrangement of the surface inclines throughout the mouth is such as to permit antagonism of the teeth over from about three-fifths to the entire extent of the dental arches, on every plane of articulation (excepting for the first part of the cutting motion), and to afford the greatest amount of contact surface for the attrition of food.

One appreciates the beauty of the general relation of the articulating surfaces as one notes the effects of wear upon the teeth. For example, as the cusps wear down the lower jaw moves forward, and the inner surfaces of the upper incisors become thinner and thinner. When the flat surfaces of the molars alone remain, the cutting edges of the incisors, which projected over the lower teeth, have also been worn away, and we have the characteristic grinding surface called "double teeth" all around.

So far our attention has been directed to an ideal dental apparatus taken as a whole, but in its various divisions there is an equal beauty of adaptation of means to ends, and each part is as essential to the working of the whole as is any part to the whole of a finely-constructed machine.

First, we find the arches divided into thirty-two portions, each portion a tooth, having that form, size, and strength best adapted to its special office in the completed arch. Each tooth forms with the jaw a compound lever, intended to transmit its proportionate amount of force from the masticatory muscles to the object in contact with its grinding surface, the fulcrum being at the dento-maxillary articulation. The free end of each tooth antagonizes with two teeth of the opposite arch, while it is supported laterally by contact with its fellows, at the point where support is most needed, which is near the articulating surface. Several teeth are thus involved in every important act of mastication; and all are so interlocked and bound in by the articulation and lateral contact that the greatest grinding power is secured, while the strain upon a single tooth is reduced to the minimum. (See Fig. 1—C.)

The division of the arches into separate teeth permits the elasticity necessary for the dental apparatus, lessening the danger of shocks and accidents; but its principal object seems to be to allow the slight movement essential for the accommodation of the irregular-shaped masticating surfaces to hard substances in process of reduction. This elasticity is rendered more positive by the inclination of the axes of the teeth, instead of their being stubbornly fixed in a vertical position. (See Fig. 2—I.)

The inclination of the teeth in one portion of the arch is exactly compensated by an opposite inclination at another portion, or else

by the inclination of the antagonizing teeth, and so tends to preserve the general form of the arch. Thus, we find that the upper molars are inclined outward, the lower molars inward, and the lower cuspids outward. All the teeth are inclined forward just sufficiently to overcome the opposite forces exerted by the orbicular and buccinator muscles.

When we examine the structure of the teeth we find nature not less wise. The hard, resisting, non-sensitive enamel exists not only on articulating surfaces, but covers the entire crown down to the gum attachments, as though intended as a barrier against those corroding agents whose greatest havoc is upon the more highly-organized substructure of the teeth.

Attention is invited to these facts, as they have a bearing upon some of the dental practices of to-day.

While analogy teaches that nature's form and arrangement of the dental organs are those best fitted to preserve them, evolved as these organs were under the general law of adaptation according to the need, it is true that diseases have appeared which oftentimes have overcome nature's provisions; but as we have only just begun to learn the causes of diseases, we can hardly jump to the conclusion that man has so changed all of his conditions that nature is disposing of his dental organs, nor can we suppose that he would be better adapted to his present conditions by extraction of teeth, or by so filing the teeth as to secure for them isolation and such a conical form as was necessary during his reptilian stage of evolution. This position is strengthened by practical experience and observation, which prove not only the wisdom shown in the form and arrangement of the dental organs, but that this form is to-day the best form known in which to preserve the teeth and their usefulness.

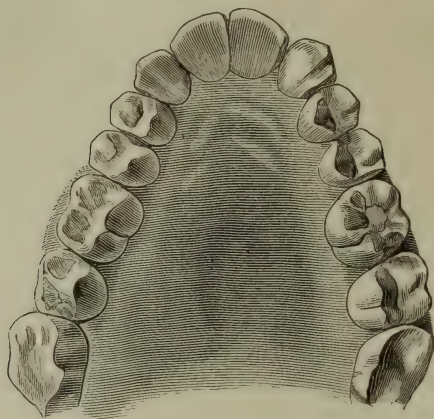
While it is not pretended that the teeth can usually be saved by any easy method, and without care on the part of the patient, yet, notwithstanding the old doctrine that "contact is always dangerous," I am fully of the opinion that they may be more easily saved by the preservation of their normal functions; and to do this we must imitate the form of perfect teeth, and their manner of support by *firm contact* with one another, however "dangerous" that may *seem* to be.

#### EXTRACTIONS CONSIDERED.

If any *one* tooth be extracted from the above described ideal dental arches, with their *perfect articulation* (excepting this *one* be from among the six lower front teeth), there will occur no important change in the position of the other teeth: the space will remain nearly the same, as the remaining teeth will be held in position by occlusion with the teeth of the opposite jaw.

If one of the *lower incisors* is lost, contact will again be secured by flattening of the lower arch, with the appearance of over-prominence of the upper front teeth; or, the entire lower arch will, be-

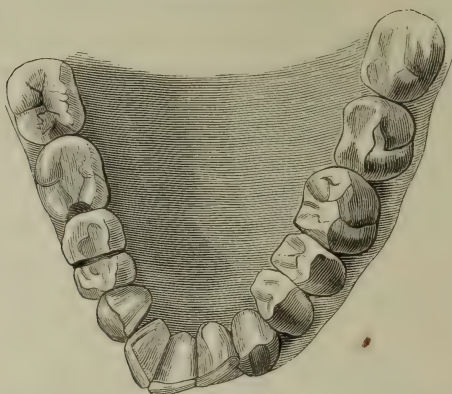
FIG. 12—E.



Superior Arch. Lateral incisors lost.

cause of loss of central support, drop inward and become narrower. This will be accompanied by a similar narrowing of the upper arch, and the forcing forward of the upper incisors and cuspids.

FIG. 12—F.



Inferior Arch. Left lateral incisor and right first molar lost. Arch still overcrowded; only one space exists, and that, a filled one between the bicuspid, is held open by the upper teeth.

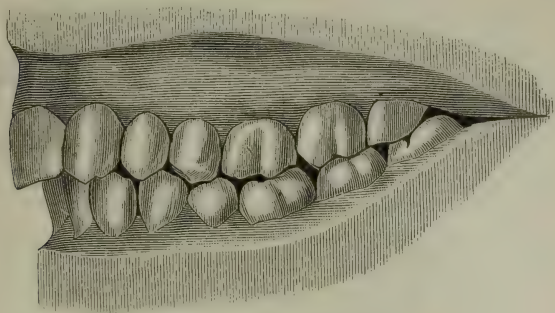
The contraction of the lower arch in Fig. 12—F is a typical illustration of what may follow the extraction of a lower incisor.

The upper arch, Fig. 12—E, is also contracted, no doubt partly because of the contraction of the lower arch,—while an excessive



projection of the upper front teeth has been prevented, owing to the loss of the superior lateral incisors.

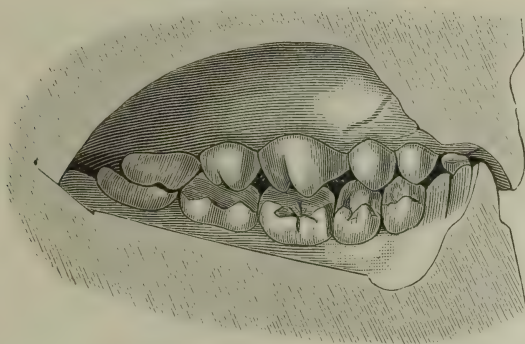
FIG. 12—G.



Profile, Left Side, Exterior View.

Exteriorly the articulation appears good (Fig. 12—G), excepting for the "jumped bite,"—*i. e.*, when the lower teeth strike one cusp too far back of their normal position.

FIG. 12—H.



Profile, Left Side, Interior View.

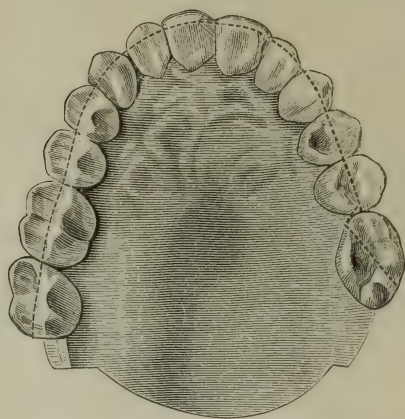
The same seen from the inside of the mouth, as in Fig. 12—H, shows how the inward tipping of the teeth has separated their grinding surfaces, rendering mastication impossible for that side of the mouth. (See Fig. 2—II, and compare Fig. 12—H with Fig. 1—C, and Fig. 8.)

But now let us suppose a more common case, *viz.*, that of the extraction of all the first molars from the same ideal mouth. What happens will vary much according to the time at which it is done.

The extraction of the first molars at any time previous to the appearance of the second molars is the removal of at least one half and often a much greater proportion of the entire grinding surface

of the teeth, and the health of the little patient may be undermined from inability to properly chew its food. If the first molars are lost before the eruption of the bicuspid, the bite will be shortened, and the lower incisors will drive harder than normal against the upper incisors, thereby forcing the latter forward and apart. This result will be greatly favored if the deciduous molars, as is often the case, are badly decayed, or lost before their proper time. The bicuspid finally come down in a straggling sort of way, generally too far back, and too far in toward the cavity of the mouth. The teeth are apt to get caught in these false positions by the articulation, and the arches are left permanently deformed. The bicuspid are likely to be rotated more or less upon their axes, and here and there spaces will be held open during life. The lower incisors will have a tendency to tip backward, owing to the too hard driving against the upper teeth. This finally causes a sharp angle, and overcrowding in the lower cuspid region. Therefore, extraction at this time is likely to cause contraction of both arches, over-projection of

FIG. 13—I.



Upper Teeth in contact all around. Dotted line shows deviation from normal line of contact.

the upper front teeth, flattening of the lower incisors, and irregularity in the lower cuspid regions. The second molars will touch the bicuspid, and soon all spaces will close up where not prevented by a faulty articulation. The molars may *appear* to articulate fairly when viewed from the outside.

In some cases of great overcrowding with irregularities, it seems as though more was gained by this early extraction than if it were done later; but we must remember that time during the period of development is a great regulator of teeth; so it becomes a question whether we accomplish more even in the most favorable case than to contract the arch and do other harm.

Figs. 13—I—J—K—L—M—N are taken from the mouth of a patient about eighteen years of age. The *first* molars of the *left side only* were lost at nine years of age. The lower wisdom-tooth of the same side is the only one yet erupted. The left side of the face is much flattened, causing a lack of symmetry amounting to a serious deformity.

Fig. 13—I shows the teeth of the upper arch, all in contact. The

FIG. 13—J.

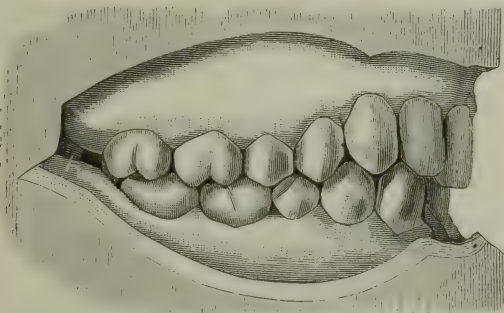


Lower Arch—badly illustrated. The teeth on the left side of the engraving—which corresponds to the right side of the mouth—appear tipped inward, whereas they ought to be normally erect.

left side is contracted, and the second molar has turned on its axis during its forward movement, as indicated by the dotted line.

Fig. 13—J shows the lower arch much contracted on the right side, and the wisdom-tooth in position. (The right side of the cut corres-

FIG. 13—K.



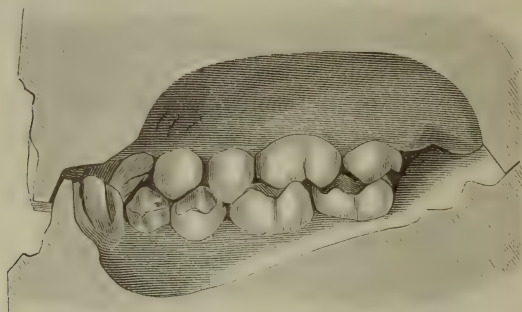
Right Side. Exterior View.

ponds to the left side of the mouth.) The spaces are almost entirely closed, yet the front teeth are evidently crowded just the same as they were before extraction of the molars.



Fig. 13—K shows the articulation (exterior view) of the right side of the mouth.

FIG. 13—L.



Right Side. Interior View.

Fig. 13—L is the interior view of the same side. The articulation is unusually good.

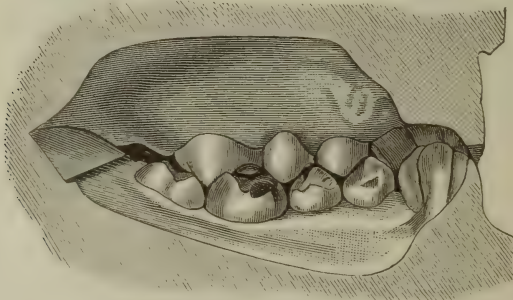
FIG. 13—M.



Left Side. Exterior View.

Fig. 13—M is an exterior view of the side from which the extractions were practiced. Articulation *appears* good.

FIG. 13—N.



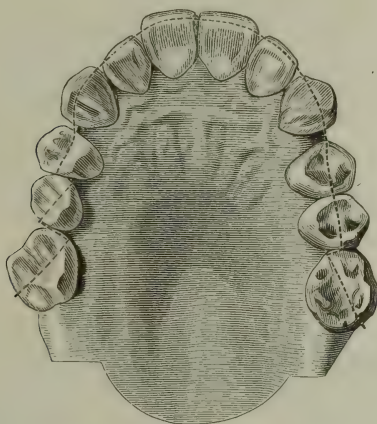
Left Side. Interior View.

Fig. 13—N is an interior view of the case last described, and

shows that most of the grinding surface of the second molar is lost. Compare the articulation of N with L, and see how inferior it is, even with its wisdom-tooth in position, whereas neither is present in L.

If the first molars are extracted at about the time of the appearance of the second molars (the lower perhaps a few months earlier than the upper), probably the least injury will be done. At first the *bicuspid*s, if well formed and articulated, will drop back together, leaving a space back of the cuspid; but if not well articulated, they, too, may separate a little. (See Fig. 14—O.) The second molars

FIG. 14—O.



Upper Teeth. Spaces all closed excepting those next to the eye-teeth. Dotted line shows the amount of rotation of certain teeth.

soon touch the bicuspids, sometimes without much forward tipping, and the articulation from the outside appears good, and the case is considered a success. But if you will examine the articulation from the inside, you will usually find that the inner rows of cusps do not articulate at all. (See Figs. 14—Q and 15—S and T.) This is not surprising when we reflect that after the arch is broken its sides contract; and this means that the molars have leaned in a little more toward the cavity of the mouth, causing the inner rows of cusps to separate, while the outer rows remain in contact. (See Figs. 12—G and H.) Any little dropping back and apart of bicuspids and cuspid will be overcome in a few years (if the arch were normal), either by a return to their former positions, or by narrowing and flattening of the anterior portion of the arches, and will end in contact all around.

This I believe to be the best possible result after such extractions, it being nearest to that of nature's unbroken arch.

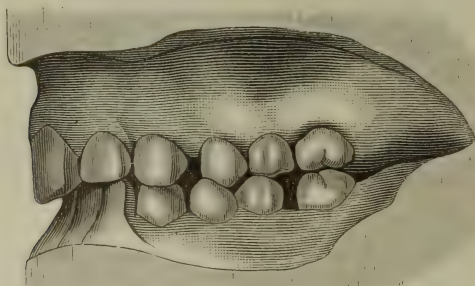
Unsupported teeth are sure to move till support is secured by contact or by a friendly articulation. Secondary contact, although never so good as primary, is the best we can hope for after unnatural spaces have been made in the dental arch, for the gum is again protected and the teeth supported.

The upper molars always rotate during their forward movement, the buccal portions moving fastest (see Fig. 13—I and Fig. 14—O), causing the new articulation to become a mere hit or miss (mostly miss), owing to the changed relation of the natural planes of articulation. This cannot be otherwise, when the principal grinding surfaces have been removed, leaving bicuspid to antagonize with second molars and cusps and indentations twisted out of their just relation.

Figs. 14—O—P and Q are taken from the mouth of a person eighteen years of age. All the first molars were extracted at about the time of eruption of the second molars.

Fig. 14—O is the contracted upper arch with teeth all in contact, excepting that the eye-teeth still stand alone. The dotted line shows the deviation from the normal line of contact, and how much the molars have rotated thus far in their forward movement.

FIG. 14—P.



Left Side. Exterior View.

In Fig. 14—P we see the upper second molars in contact with the bicuspid, and their articulation with the lower molars *appears* to be good. The lower molar, as is usually the case, has been slower to close up to the bicuspid, but by the time the wisdom-tooth has erupted all spaces will doubtless be closed. If a space ever existed between the upper bicuspid, it has been closed by the bracing contact of the upper second molar; while a corresponding space between the lower bicuspid must have been closed by the articulation with the upper second bicuspid.

Fig. 14—Q, a view from the inside, shows how bad the articulation really is. This condition will be still worse, owing to the further

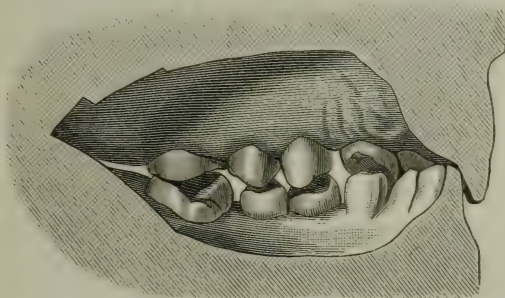


tipping of the molars, which must occur before the remaining spaces are closed, and the arches find a position of equilibrium.

Never after the eruption of the second molars can extraction of first molars be considered other than a misfortune.

After the first molars have been extracted the enormous strain of mastication is brought to bear upon the unsupported second molars, whose yielding sockets allow them to tip till they touch the bicuspid. The time required for this result varies from a year or two in young

FIG. 14—Q.



Left Side. Interior View.

persons to several years, after late extractions of strongly-set teeth.

The upper molars rotate upon their axes and tip forward till the outer corner of the second molar touches the middle of the distal surface of the bicuspid, while the anterior approximal surfaces of the third molars rest in the concavity of the distal surface of the neck of the second molars. The articulating surfaces of each, reduced to one or two points, do not permit of any proper grinding movement. During the time occupied by the closure of the spaces mastication has been difficult, for added to the defective grinding surfaces is the great discomfort caused by the irritation of the gums by hard substances, and by the strain upon the sockets of unsupported teeth. The changed relations of the second and third molars renders their cleansing difficult, and when decay occurs, as often happens, it is most difficult to treat, especially when it appears in the mesial surfaces of the third molars.

After late extractions the teeth are often found so braced in their manner of contact, and so much tighter than they ever are when in their natural positions, that it is difficult to pass even fine waxed silk between them.

If the author of the expression that "contact is always dangerous" made his study and observation upon such cases as this, there was a show of reason for his conclusions. But the fact is that the

cause of recurring decay in such mouths is not *contact*, but the *changed relations of the teeth*, which, besides impairing their functions, *renders cleanliness extremely difficult* if not impossible.

But why extract at all? For, as is shown above, besides the loss of important organs, we shorten the bite, contract the mouth, disturb the facial expression, and secure at last an arrangement of the teeth less favorable for their preservation than existed at first.

It is not denied that in some cases decay is lessened between certain teeth during a part of the time that the spaces exist after extraction; yet I am inclined to think that the temporary advantage which any given space may afford is overbalanced by the greater danger that it offers when it is *nearly closed*, or while the teeth are *loosely in contact*. At this time food easily wedges between the teeth and requires *extra* efforts for its removal.

The same care with the brush and silk that is needed to prevent decay between teeth in their natural condition is often insufficient to remove the dangerous deposits of food from the pockets about the exposed necks, and decay is apt to occur.

In uncleanly mouths we often find decay in the well-open spaces, for food left to ferment in contact with the teeth will cause decay as soon upon surfaces not in contact as it will between those that are in contact, and even *sooner* if quantity of fermentable products is a factor in the problem. Now, if extraction were practiced to *prevent contact*, it is a failure, for there has been contact all the time between *many of the teeth*, and finally we have it between all. The few spaces that were secured—say between bicuspid and cuspid—only existed for a time, and perhaps fortunately if the patient were not cleanly.

Really there seems to be but one excuse for the extraction of the first molars: If their structure were so bad that they were sure to be lost later in life, we have done well in choosing a time for their extraction when the spaces will close with the least tipping of the teeth, and with the least derangement of the grinding surfaces.

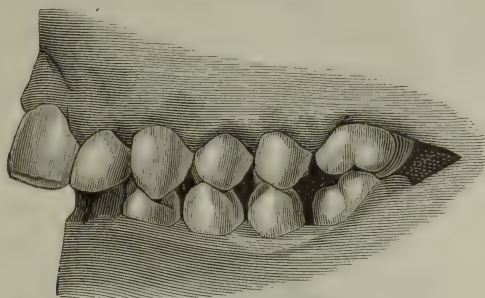
I will leave for a moment our typical denture, to which until now we have mostly confined our studies, to incidentally speak of one deformity, hoping to more clearly elucidate certain principles which ought always to be borne in mind whenever irregularities are to be treated by the extraction of teeth. I refer to those cases of marked forward bracing of the anterior teeth where the lower incisors strike the necks of the upper incisors, forcing them horizontally forward.

While I will thank the man who will show me how to treat this condition, I pity the patient who has been subjected to the loss of all his first molars, or, worse yet, to the loss of the first *lower* molars

only. The bite is shortened by this treatment, and the lower incisors drive harder against the upper gums, and the ugly protrusion of the upper teeth grows worse.

This condition is illustrated by Figs. 15—R—S and T.

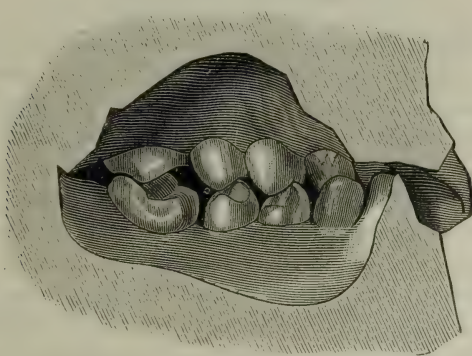
FIG. 15—R.



Left Side. Exterior View.

The patient, now fourteen years of age, lost his first molars at the age of eight or nine years. At present the lower teeth strike the gums just back of the upper incisors, while the latter have been forced forward as seen in Fig. 15—R, which is an exterior view, and shows how nearly the spaces of the left side are closed up.

FIG. 15—S.



Left Side. Interior View.

Fig. 15—S is an interior view of the last described. It shows the tipping of the molars and the bad articulation, and also the lower incisors striking the upper gums.

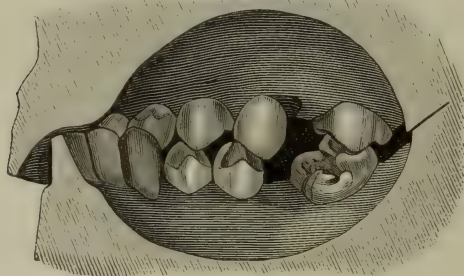
The spaces of the right side (Fig. 15—T) are not so nearly closed as they are on the opposite side, because the moving up of the molars has been arrested by the presence of the anterior buccal root of the first upper molar. In this case the lower arch has unfortu-



nately been still further diminished by the extraction of an incisor, and where the articulation will finally find its equilibrium is difficult to predict.

We need not hope to improve deformities at the front of the mouth by the extraction of the first molars, when there is a marked forward inclination of the front teeth, including the bicuspid. The overcrowded front teeth will usually retain their position, owing to the increased bracing caused by the shortened bite. But if such overcrowding is at all relieved, it can only be by a forward movement which increases the forward projection of the arches, and the production of a deformity worse than the one sought to be corrected.

FIG. 15—T.



Right Side. Interior View.

If the deformity consists simply of a too great forward projection of the upper arch, this projection will only be increased by the loss of the first molars, for owing to the shortened bite the forward strain upon the front teeth will be increased. After such teeth have been drawn back into their desired positions by the use of appliances they will drop forward into their former positions, because the natural forces will continue to act after the patient has tired of retaining plates and their accompanying evils.

Those who followed the description, at the beginning of this paper, of the form and inclination of the teeth in relation to the forces acting upon them, must see to what a mathematical certainty the matter is reduced. So, if one takes the trouble to acquaint himself with a given case, he may safely predict what form the arch will take after certain extractions shall be practiced.

One hardly needs to consider the results of extraction of any other than the *first molars*, since these teeth have been made to bear the penalty of most dental sins, as well as sins of dentists.

The wisdom-teeth, if of bad structure and in an overcrowded jaw, are often better lost, but the bicuspid *never*, if dental art can save

them through life, excepting possibly for the correction of certain deformities.

If the second molar ever need be lost, it should always be before the eruption of the third molar, in order that the latter may come into place with as little tipping as possible.

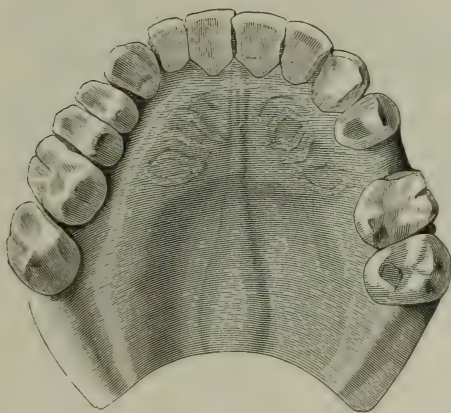
While admitting the value of extraction as a means of correction of certain irregularities of the teeth, I am forced to believe that far more irregularities have been *caused* by extractions than could ever have been *corrected by extraction*.

#### FILING CONSIDERED.

What has been said of the tendency of the teeth to change their places, after the breaking of the arch by extractions, may equally apply where spaces have been made by the use of the file; but for several reasons this last plan of securing *temporary* spaces is more disastrous in its results than is that of certain extractions.

Some of the immediate consequences of filing are bad enough to

FIG. 16—U.



condemn the practice, in my opinion (if I were to be the subject, and I have been), such as the diminishing of the grinding surfaces, lessening the force of mastication by the removal of lateral support, and permitting an unnatural strain upon the sockets of adjoining teeth; but more evident and annoying is the pain caused by the exposure of the terminal dentinal fibrils, and by the crowding of food into the spaces and against the gums.

A single filed space in a well-articulated arch is likely to remain through life.

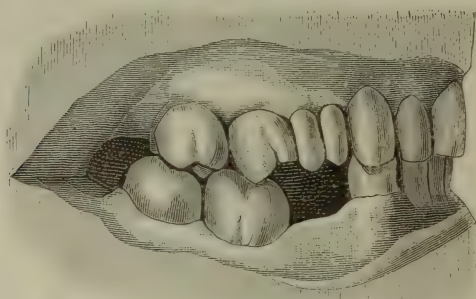
At first such a space is cleansed without difficulty, but constant crowding against the gums causes their recession, and a little pocket

is thus formed, in which food is apt always to remain, although it may be *called* a "self-cleansing space," and sooner or later new decay begins at that point, and is most painful and difficult to treat. Restoration of contour at this stage is not easy, yet patients gladly submit to it that they may be rid of an unnecessary nuisance.

When many filed spaces have been made in the arch the teeth move up until they are again in contact, just as they do after extractions, unless prevented by a faulty articulation. (See Figs. 16 and 17.)

The new contact, instead of occupying the smallest extent of the convexity of the thickest and most perfect portion of the enamel, with the space at the gum washed by the fluids of the mouth, is at or near the gum, where the enamel is thinnest, or perhaps has been filed away, leaving the dentine exposed.

FIG. 16—V.



Figs. 16—U and V illustrate a case after extensive filing has been practiced. Although all the teeth have been repeatedly filed and cut to make spaces, only one space now exists in the upper arch, and that is prevented from closing by the articulation; and although the teeth have been filled and refilled (and well done), in all but two spaces in the upper teeth the fillings have again required to be renewed or repaired, and the teeth are by no means of the poorest quality.

Spaces are sometimes made on the lingual side opening towards the mouth, and contact between the teeth is secured at a point toward the buccal side near the grinding surface; but the natural line of contact is a regular curve passing through the center of the articulating surfaces of each arch. (See Figs. 1—A and B. If this line is transferred to a point passing through the outer row of cusps, the forces of the jaws will act upon the unsupported inner portions of the teeth, causing them to rotate upon the pivotal points of contact, and the broad filed surfaces of certain teeth will come flatly

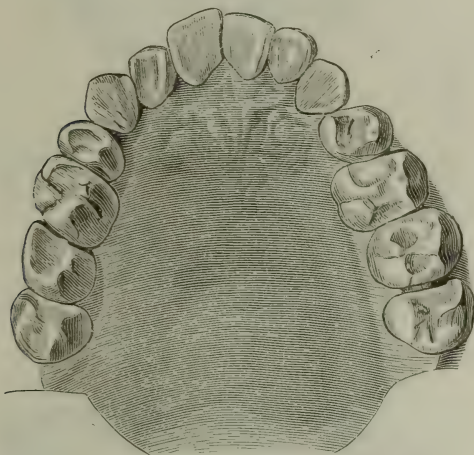


together, while between others the V-shaped spaces will be opened wider.

Any plan of filing the teeth that changes the contact from the normal point will diminish the size of the arch, because each tooth occupies such a proportion of the arch that the natural points of contact are on a line passing through the greatest diameter that the teeth can possibly furnish without injuring the articulation. (See Figs. 16—U and V, and Figs. 17—W—X and Y.)

The system of filing the teeth presupposes that the spaces will be self-cleansing, and therefore the dentist is apt not to instruct the patient either in the need or in the special ways of securing their perfect cleanliness. In the long run filed teeth require more care on the part of the patient to preserve them than do teeth in normal contact. Food is sure to wedge between them, and is often dislodged

FIG. 17—W.



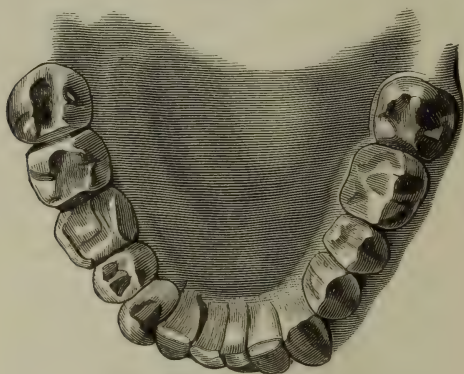
with difficulty. The filed surfaces are less capable of resisting corrosive agents, and failure to secure absolute cleanliness soon results in decay.

Caries is likely to appear and reappear at the gum-margin of the fillings, each time lower than the last. If a point of contact had been secured at or near the gum-line, it is lost by the undermining decay, and the teeth move up and transfer the point of contact perhaps far below the gum, and this in turn is destroyed by new decay.

After repeated slicing with the file for the renewal of fillings, it becomes impossible to secure adequate anchorages without endangering the pulp; or the pulp may be exposed by decay at the thin sensitive

neck, and at last must be destroyed. Weakened by decay, by filing, and the cutting away necessary for root-treatment, and robbed of their support, the teeth break down under the ever-increasing strain brought upon them. Extraction affords about the first relief to such patients, and artificial dentures are a boon to those who have been compelled for years to painfully hobble through their meals

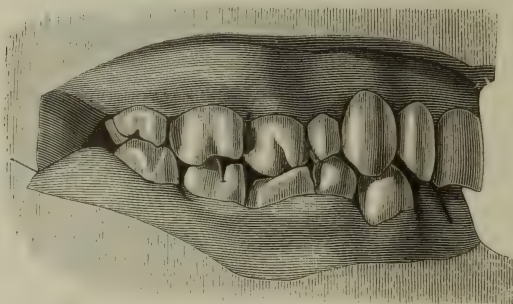
FIG. 17—X.



without even a crutch to relieve the irritated gums and the mutilated sensitive stumps of teeth.

Some pretend that the results described above are only true when separations have been made solely for the convenience of the operator, but if that is true it speaks badly for the honesty and

FIG. 17—Y.



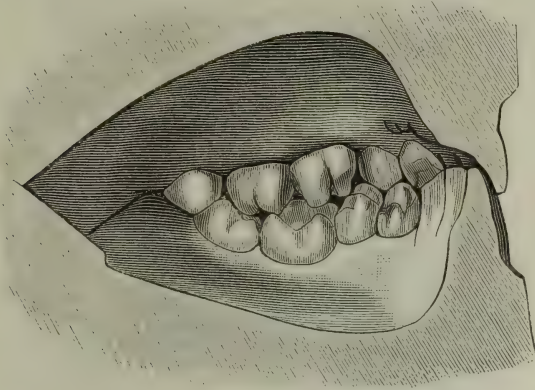
ability of the mass of those who have been or are practicing this method. As for the large proportion of cases I have seen, the above statement would be applicable,—the degree varying only as regards the time that has elapsed since the filing was done. I therefore prefer to believe the fault to be in the method.

Figs. 17—W—X—Y and Z need no explanation. They represent a dental wreck. There is contact everywhere of the worst sort. The patient is a martyr to a false theory.

I have seen cases of filing done by men of great skill and ability; men well versed in the supposed foundations of the system; who have striven earnestly and long, and *saved* the teeth, yet I should consider their results as failures. The teeth were saved, but their usefulness was destroyed.

Teeth unable to properly masticate the food better be substituted or supplemented by a well-constructed appliance. The millennium is not hastened by dinners goaded on by tooth-picks and fluids to an overworked stomach. When the medical profession learns more of the causes of dyspepsia in America, an uncomfortable fact may be laid at the door of the dental practitioners.

FIG. 17—Z.



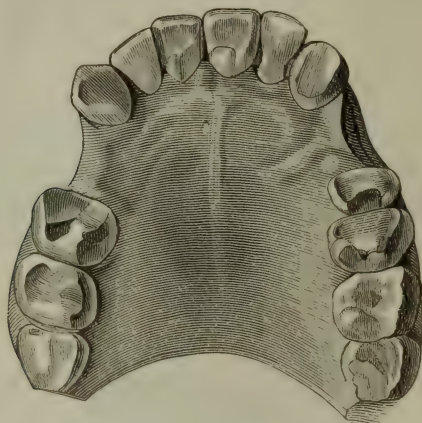
After a time teeth extensively filed cease their wandering and assume a fixed position, and then *tight contact between the teeth will be the rule*; but here and there a permanent space may be left, and that without any apparent reason, unless both arches are looked at as a whole when in articulation; but when so considered they will be found to form one unbroken line of teeth, contact being secured sometimes upon the lower and sometimes upon the upper arch, but always made continuous by the articulation.

Figs. 18—a—b—c and d show a case after irregular extraction and general filing has been practiced. The teeth in both arches have fallen together as much as is possible. All the filed spaces have secured new contact. The spaces left by the extractions are only partly closed, because the movement of the teeth has been arrested by the articulation. The filed spaces have caused the patient great annoyance, and there has been repeated failure of the fillings. A



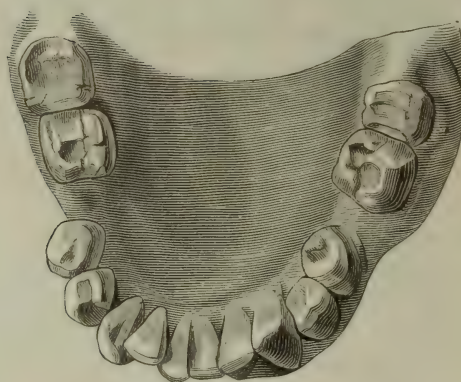
system of partial contouring is now being practiced whenever new fillings are needed, and the patient is gradually made comfortable by the knuckling of approximate surfaces at a point away from the gum.

FIG. 18—a.



Upper Teeth after Extractions and Filing.

FIG. 18—b.



Lower Teeth of Same Mouth.

While it is not usually advisable to attempt to restore the contour of all the teeth mutilated by filing, it often occurs that here and there restorations may be practiced with great benefit to the patient, relieving excessive gum-pressure or a sensitive tooth-neck.

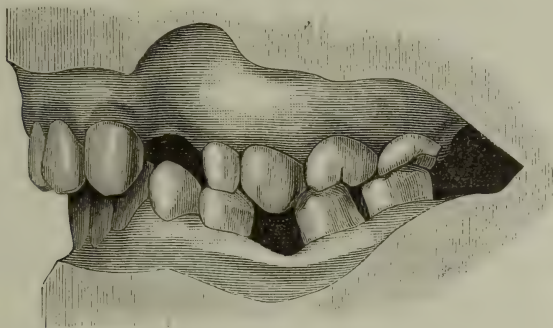
I have been begged to do this when the patient knew that it involved destruction of the pulp, and root-filing; and this, too, in one case that has been published as showing the typical advantages of free and self-cleansing spaces.

Filing of the upper incisors, in such a way as to leave a slight

point of contact near the cutting edge, has been a successful plan of treatment in some cases.

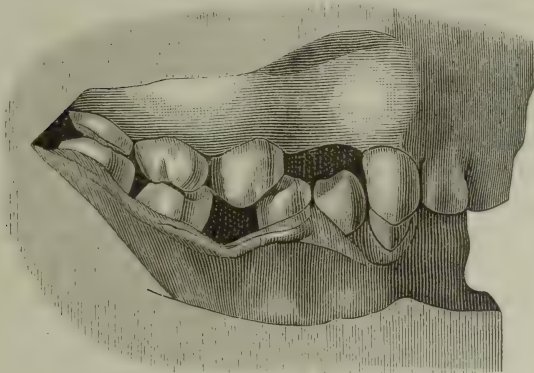
Those who still believe in the advantage of open spaces between the teeth of *their patients* may find one crumb of comfort from these studies, in the fact that if the filing is limited to the teeth of one jaw their steadfastness will be secured by the articulating teeth, and the spaces *will* remain; or they may, by skipping here and there about the mouth, make a few spaces which may be retained by the

FIG. 18—c.



Left Side.

FIG. 18—d.



Right Side.

opposing teeth; but any other plan of filing will cause disappointment, for their dreaded contact will assuredly recur.

In conclusion, I would earnestly suggest that one who is about to enter upon this method of practice should first receive instruction from the most scientific filer of teeth, and that he have made in his own mouth just one so-called "self-cleansing space," and after six months carefully observe whether he is masticating his food upon the side left in nature's form or upon the one improved by the art of man.

## DENTAL NOTATION.

BY W. STORER HOW, D.D.S., PHILADELPHIA, PA.

THERE is much need of a compact yet comprehensive system of symbols for the facile expression of the normal and abnormal characteristics of erupted teeth in the human and as well the animal species.

So far as I am aware, the Hillischer System, outlined in the *DENTAL COSMOS* for April, 1885, page 253, is the only one that has been brought to the notice of the profession with some considerable promise of fulfilling the required indications. Further study of that system will doubtless eventuate in its modification to a greater or less degree, and either establish its place in dental nomenclature, or lead to the discovery and adoption of a better scheme.

With a view, therefore, to the furtherance of so desirable a result, a few hypothetical illustrations of the employment of the Hillischer System in dental literature are here brought forward, and some modifications of the system introduced.

The descriptive diagram for the permanent teeth is as follows. Four groups of eight numerals are arranged thus:

$$\begin{array}{c} 8 \cdot, 7 \cdot, 6 \cdot, 5 \cdot, 4 \cdot, 3 \cdot, 2 \cdot, 1 \cdot \\ \hline 8 \cdot, 7 \cdot, 6 \cdot, 5 \cdot, 4 \cdot, 3 \cdot, 2 \cdot, 1 \cdot \end{array} \quad \begin{array}{c} \cdot 1, \cdot 2, \cdot 3, \cdot 4, \cdot 5, \cdot 6, \cdot 7, \cdot 8 \\ \hline \cdot 1, \cdot 2, \cdot 3, \cdot 4, \cdot 5, \cdot 6, \cdot 7, \cdot 8 \end{array}$$

The respective teeth of the upper or lower jaw are indicated by the position of the numerals above or below the horizontal line, and their situation relative to the median line is shown by points on the median-line side of the figures.

For instance,  $1 \cdot$  represents the superior permanent right central and  $\cdot 2$  is the symbol of an inferior permanent left lateral. It is mnemonically easy to remember that a figure *above* the line stands for an *upper* tooth, and a figure *below* the line for a *lower* tooth; while the *right* side of the median line of both jaws is indicated by a *point* on the *right* side of a figure, and the *left* by a *point* on its *left* side. The deciduous diagram is thus expressed:

$$\begin{array}{c} 7 : , 6 : , 3 : , 2 : , 1 : \\ \hline 7 : , 6 : , 3 : , 2 : , 1 : \end{array} \quad \begin{array}{c} : 1 , : 2 , : 3 , : 6 , : 7 \\ \hline : 1 , : 2 , : 3 , : 6 , : 7 \end{array}$$

The subjoined diagrams for teeth of both the right and left sides, and the upper and lower jaw, complement the previous diagrams as general expressions for characteristic groups of permanent or deciduous teeth:

Permanent.

$$\begin{array}{c} \cdot 8, \cdot 7, \cdot 6, \cdot 5, \cdot 4, \cdot 3, \cdot 2, \cdot 1 \\ \hline 8, 7, 6, 5, 4, 3, 2, 1 \\ \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \end{array}$$

Deciduous.

$$\begin{array}{c} : : : : : \\ 7, 6, 3, 2, 1 \\ \hline 7, 6, 3, 2, 1 \\ : : : : : \end{array}$$



A carious cavity, defect, filling, or substitute may be denoted by an initial letter before or after a symbol, and bearing the signification indicated in the following table:

<i>a</i> —Artificial substitute or plate.	<i>r</i> —Root.
<i>b</i> —Buccal position.	<i>s</i> —Supernumerary.
<i>c</i> —Coronal position.	<i>t</i> —Treated.
<i>d</i> —Distal position.	<i>u</i> —Ulcerated.
<i>e</i> —Eroded surface.	<i>x</i> —Extracted.
<i>f</i> —Filling,—of any material.	<b>A</b> —Acid.
<i>i</i> —Irregular position or shape.	<b>Al</b> —Alkaline.
<i>l</i> —Labial position.	<b>N</b> —Neutral.
<i>m</i> —Mesial position.	<b>I</b> —Slightly acid or alkaline.
<i>o</i> —Opening or cavity.	<b>L</b> —Obviously acid or alkaline.
<i>p</i> —Palatal or lingual position.	<b>U</b> —Decidedly acid or alkaline.
<i>pp</i> —Pulp.	<b>Q</b> —Excessively acid or alkaline.

When initial letters are placed within parentheses a confluence of several cavities is indicated, as for example:  $7 \cdot (d b m c p o)$  (the permanent inferior right second molar has a distal cavity connecting with a buccal cavity continuous with a mesial cavity that runs into a coronal cavity joining a lingual cavity). The omission of the parentheses would leave the description applicable to the same cavities distinct from each other in the same tooth.

The table could easily be extended to include other characteristics or conditions or concomitants, but it seems desirable to confine the formula within such limits that it may be readily kept in mind for immediate use on occasion.

For illustration, let us suppose a dentist to be describing in writing some cases in practice.

Case I. Male patient, aged 45, exhibiting a swollen face. Examination revealed  $5 \cdot (d c m p p o) u$ ,\* which had occasioned a perforation of the antrum. Tri-weekly injections of the following solution,

Hydronaphthol, grs. x;

Glycerin, ʒ ij;

Aqua dest., ʒ ij.,

at a temperature of about 100° F., completed the cure of the antral lesion in the course of the two weeks that the tooth-socket remained open sufficiently to permit the inflow of the solution.

The condition of  $5 \cdot d c m o \dagger$  was such that non-conducting fillings were necessary to save the tooth alive and prevent possible affections like those before described.

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\*The superior permanent second bicuspid having a compound cavity, due to the confluence of distal, coronal, and mesial caries, involving the pulp-chamber and occasioning the abscess or ulceration which had extended to the antrum.

†The superior permanent right second bicuspid having distinct carious cavities in its distal, coronal, and mesial regions.

Case II. Female of twelve years;  $\frac{6x}{6x}^*$ . They had been removed

during her eighth year.  $\frac{57}{57}^\dagger$  had relatively approximated during the process of eruption, until an inconsiderable space separated them, their occlusion being nearly normal.

Case III. Male of about thirty-seven years; having in the mouth

$$\begin{array}{r} 7 \cdot, 6 \cdot, 3 \cdot r, \cdot 3 r, \cdot 7, \cdot 8 \\ \hline 8 \cdot, 7 \cdot, 5 \cdot, 4 \cdot, 3 :, 2 \cdot, 1 \cdot, \cdot 1, \cdot 2, \cdot 3, \cdot 5, \cdot 8^\ddagger \end{array}$$

It was obvious that  $3 :$  had become permanent, and the simple scientific precision with which this anomaly is expressed and made a matter of record by the Hillischer formula is certainly noteworthy.

Removable bridge substitution having been determined upon, the sides of  $6 \cdot, \cdot 7$  were cut parallel, gold collars driven tightly on them, and over these collars telescoping gold caps were accurately fitted for optional removal or replacement. The treated and filled  $3 \cdot r, \cdot 3 r$  were dressed into roof shapes, and fitted with caps and tubes that were fixed in the roots by cement, which also hermetically sealed the collared caps on the roots.  $3 a$  plate teeth were backed and soldered to suitable caps having posts that fitted the tubes tightly, but were removable at will. Bridge connections carrying porcelain-faced and gold-covered  $5 \cdot a, 4 \cdot a, 2 \cdot a, 1 \cdot a, \cdot 1 a, \cdot 2 a, \cdot 4 a, \cdot 5 a, \cdot 6 a$   $\S$  were soldered to the telescoping caps and crowns, and the result was a readily removable yet firmly-fixed and useful denture.

Case IV. Male, six years old, presenting a denture as follows:

$$\begin{array}{r} 6 \cdot c o, 7 : d m o, 6 : d o, 3 :, 2 :, 1 :, : 1 :, 2 :, 3 :, 6 :, 7, m o, : 6 c o \\ \hline 7 : b o, 6 :, 3 :, 2 :, 1 :, : 1 :, 2 :, 3 :, 6 :, 7, \cdot 6 c o \end{array} \parallel$$

\* The permanent first molars, both superior and inferior, had been extracted.

† The superior and inferior permanent second bicuspid and second molars.

‡ The superior permanent right second molar, first molar, cuspid root, left cuspid root, second and third molars, with the inferior permanent left third molar, second bicuspid, cuspid, lateral, central; the right central, lateral, deciduous cuspid, permanent first and second bicuspid, second and third molars present.

§ Artificial superior permanent right second and first bicuspid, lateral, central, left central, lateral, first bicuspid, second bicuspid, and first molar.

|| The superior permanent right first molar, coronal cavity; deciduous second molar, distal and mesial cavity; first molar, distal cavity; cuspid, lateral, central, left central, lateral, cuspid, first molar, second molar, mesial cavity; permanent first molar, coronal cavity; inferior permanent left first molar, coronal cavity; deciduous second and first molar, cuspid, lateral, central, right central, lateral, cuspid, first molar, and second molar having a buccal cavity.

The cusps of  $\overline{6}$  were barely visible and the process of eruption normal. The carious deciduous teeth were filled with gutta-percha and the permanent teeth with gold.

These examples will suffice for the present purpose of directing attention to the subject, which will subsequently be given further illustration.

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## CORRESPONDENCE.

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### THE MILLER MATRIX.

TO THE EDITOR OF THE DENTAL COSMOS:

DEAR SIR: Within the last ten days I have learned that Dr. Wilhelm Herbst claims priority of invention of the spring matrix devised and patented by me, and that he has in language more forcible than courteous accused me of appropriating his invention.

If Dr. Herbst and myself had conceived the same idea simultaneously, it would not have been the first instance of such a coincidence. The facts—called stubborn things—are all that I have to offer on my side, and I am content to let the case rest right there.

One of these matrices made by me was presented to Dr. Wm. H. Trueman, of Philadelphia, who exhibited the same before the Pennsylvania Association of Dental Surgeons, October 13, 1885, a report of which meeting was published in the DENTAL COSMOS for January, 1886, page 45, with an illustration of the matrix.

In a quarterly circular published by Messrs. C. Ash & Sons, London, Eng., March, 1887, there are illustrations of Herbst's spring matrices, followed by this statement: "These matrices were first brought to the notice of the profession by Dr. Herbst, in the January (1886) number of *Correspondenz-Blatt*."

It is a little curious that Dr. Herbst did not have among the multitudinous devices shown by him at his American clinics a single sample of a matrix which he had invented, and for which it is claimed in the Ash circular before alluded to that it is "the simplest and most suitable."

It would be easy to multiply words in a discussion of this character and to retort in kind, but I deem it the better course to submit this simple statement of *recorded* and illustrated facts without further comment.

Yours truly,

W. B. MILLER.

ALTOONA, PA., June 16, 1887.



## PROCEEDINGS OF DENTAL SOCIETIES.

## NEW YORK ODONTOLOGICAL SOCIETY.

THE New York Odontological Society held its regular monthly meeting on Tuesday evening, April 12, 1887, in the Hall of the Academy of Medicine, No. 12 West Thirty-first street.

The vice-president, Dr. J. Morgan Howe, in the chair.

A motion that the reading of the minutes and "Incidents of Office Practice" be dispensed with was adopted.

Vice-President Howe. The subject of the evening is a paper by Isaac B. Davenport, M.D., M.D.S., of Paris, France, which will be read by Dr. Bogue, the president of the society.

Dr. E. A. Bogue. Gentlemen: At the request of my associate I shall undertake to read his paper, although I confess to my imperfect ability to do the subject justice, and shall therefore ask your indulgence beforehand. I am sure that there will be points in the paper that will be obscure; my reading will not be sufficiently clear to make them plain, and I shall be very thankful if questions be asked. At the risk of saying something which is known to every gentleman in the room, I will remark that Dr. Davenport has in mind the inclination inward of all the lower back teeth, and the inclination outward of all the lower front teeth, and he expects that every listener to this paper and every reader is also holding that natural ideal position in mind. Dr. Davenport also presumes that we are all bearing in mind the peculiar fact that the lower molars on their posterior side have a distinctly marked tuberosity; most distinctly marked in the first molar, a little less in the second; and beneath the tuberosity is a distinct concavity at the neck. The title of the paper is "The Significance of the Natural Form and Arrangement of the Dental Arches of Man, with a Consideration of the Changes which occur as a Result of their Artificial Derangement by Filing or by Extraction of Teeth."

[Dr. Davenport's paper will be found under the heading of "Original Communications," in this issue of the DENTAL COSMOS, page 413.—EDITOR.]

Vice-President Howe. The subject is now before the Society for discussion.

*Discussion.*

Dr. Geo. S. Allan. I should like to hear the paper discussed, but I have to take a train. The subject is a very big one, and this is a most interesting paper. Like every other question, it has two sides. With most of the statements of fact, arguments, and conclusions given in this most admirable paper I fully agree. To one portion only, in the few moments I have to spare, would I take exception,—that in reference to contour fillings. Good judgment is the first requisite to insure good practice. Contour fillings are good in their place, but they are not good all the time. Contour fillings and bad fillings are often synonymous terms, even when we leave out of question the element of skill. As a method of practice, contouring is invaluable; as the method of practice, it is bad. In my opinion, therefore, the position upon this question taken by the writer of this paper is open to the gravest objections.

Dr. F. Y. Clark. I think the practice of filing has been presented in its very worst form. Some of the diagrams represent exceptional cases, and prove a want of skill, experience, and artistic taste on the part of the dentist who performed the operations, and illustrate the method of fifty years ago rather than those of to-day. You who are familiar with the practice of the late Dr. Arthur of cutting a "V" on the palatal surface, leaving the teeth in contact above or below the filling,—thus forming self-cleansing surfaces,—know there are many cases and conditions where this practice is unobjectionable and perhaps the best. As Dr. Allan says, teeth are sometimes in such a condition that it is difficult to contour. Age and the many varying conditions should always govern our practice.

Dr. J. W. Clowes. I have hoped some one else would start the discussion of Dr. Davenport's elaborate essay, because my say has been so often heard upon the subjects of which it treats. My advocacy of the separation of teeth has always been from the standpoint of its preventive and curative effects, and yet I am unaware that a single disciple has been gained to my side. Possibly he may appear on this occasion and give me a pleasant surprise. The paper just read is colossal in proportions and grand in its wealth of illustration by casts and plates. Years of labor, of observation, and diligent research have been employed in its preparation, but its attacks and antagonisms are weak, in that they lack the essential support of underlying truth.

This testimony against separation is wholly *ex parte* in its character, and necessarily prejudiced and unfair. The odds and ends of dreadful mal-practice have been gathered in duplicate before you with intent and purpose to prove that extracting to regulate and separating to save have damaging results. Oh! my friends,

you must not look upon these counterfeit presentments of a good and glorious practice and call them "extracting sixth-year molars," "separating by file," nor "oral gardening" at all! It is not the *doing*, but *perverted doing*, that works out evil. It is not the act, but the untimely act, that brings disaster. There is so much of importance in this subject that its vastness holds me in constraint. It involves so much of blessing to suffering humanity that I feel abashed at my incapacity to set it properly before you.

Let me tell you how I deal with my patients. I feel that they are entitled to know what I propose to do for them, and the reason why. I show them the facts of separation and soundness; of contact and decay. Two teeth, pointed out as naturally apart, are examined and found whole. Other teeth are seen to touch at their sides, and inspection reveals their defects. In this simple way a great truth is proclaimed and believed. I gain their implicit faith because their intelligence comprehends what has been said. But they cannot understand why a difference of opinion exists among my profession upon a matter so plain to them; and the inquiry comes, "Why do not all dentists practice the things you advise?" And I answer, "The Lord only knows. It is hard to realize that the evident to you should be invisible to them." My brethren, I entreat you to wake up to the importance of separation among teeth, for without it their salvation is in no wise assured. Dental culture is a necessity of civilization, which, freighted from inimical forces, is full of threatenings. The gardens of the mouth invite your earnest care. Shall they develop into visions of beauty, or lapse by neglect to unsightly wastes?

Dr. W. H. Dwinelle. I am not of the faith of my worthy friend who just took his seat. I believe, as has been suggested by my friend Dr. Allan, that our practice should be eclectic. There are circumstances in which heroic treatment is necessary; but that this matter of separation should be reduced to a system I do not believe. To say that the salvation of human teeth depends upon their separation by cutting away the enamel and denuding the dentine, is to impeach the wisdom of high Heaven; it is virtually to stand here upon this little narrow footstool and proclaim that the infinite Creator above did not know how to make man, or how to place the teeth in his jaws! I protest against mangling, disfiguring, and rudely destroying the symmetry of outline of God's most beautiful handiwork as do they who practice this system of separation. The fact that Dr. Clowes can convince his patients of the truth of statements that are adverse to the opinion of the great body of dentists, is not surprising. The ignorant man is the easiest man in the world to convert to a theory that is made plausible for the moment



to his mind. I think the proposition answers itself when he says he can convince his patients of almost anything, whereas he cannot convince the profession at large.

The paper has been disparaged to-night unjustly. I was not so fortunate as to hear the first part of the paper, but I consider it a very able one. In fact, I do not know when a paper has been presented of so much vastness, so comprehensive, and involving the mechanical principles of nature to the extent that this one does. The relations of the upper and lower teeth to each other, their changes of position, regulating themselves and making themselves irregular, is presented to-night to my mind in a way that is exceedingly interesting and convincing. The fact that to narrow one arch will also change the other; that the upper jaw is the matrix of the lower, and the lower the matrix of the upper, so that when they come in contact by occlusion they are constantly changing their tendencies, just as the foundation principle is changed, all the mechanical principles involved in the relations of the upper teeth to the lower ones have been expressed here to-night. I think the paper is a very able one, and I so indorse it. I am glad that we have been able to hear the whole of it to-night, and I hope it will be carried over to another evening, when we shall have opportunity to discuss it fully in review, and also be able to see the models which further illustrate it. There is no subject of so much importance to us as this one, and I for one feel like sending over to the other side of the water an expression of thankfulness and approbation to the gentleman who has called our attention to it in so able and exhaustive a manner. There is no objection to the normal contact of the teeth. They are simply knuckled together like a row of oranges, only touching at their two convex surfaces at a single point which is in the order of nature best subserving her highest economy. If they should become decayed, treat them intelligently, but never anticipate decay by cutting away sound teeth. The principles laid down in the paper of to-night are founded upon the Almighty's universal and immutable law, and to assail them is to impeach His wisdom and truth.

Vice-President Howe. The desire of the society is that the friends who are with us from other cities will favor us with their views on the subject of the paper. It has been suggested very aptly by Dr. Dwinelle that the paper deals in principles. We hope to hear these principles discussed.

Dr. Edwin T. Darby. I came here this evening not to be heard, but rather to listen. I have been greatly interested in the paper, and it is unquestionably an able one. But while I have been interested, I have also been just a little disappointed, for I was led to suppose that the subject embraced the facial deformities which so

frequently result from the loss of the permanent teeth when removed for the correction of irregularity or the supposed preservation of remaining teeth. Those of us who have lived and practiced in Philadelphia for a number of years have frequently seen the pernicious results which have been so ably described and illustrated this evening. We have in Philadelphia one practitioner who for many years has been in the habit of extracting the lateral incisors to make room for the superior cuspids. I have learned to recognize people as his patients when seeing them in the horse-cars and upon the streets, in consequence of the facial deformity which must ensue when the cuspids are thrown so far forward. We have another practitioner who seems to think that the sixth-year molar was developed for his forceps. He almost invariably extracts the the sixth-year molars from the mouths of his young patients,—not because they are past saving or because their preservation is even doubtful, but because they are sixth-year molars. A few years ago a lady brought her little girl, about eight years of age, to me. Upon examination I found very small cavities in her sixth-year molars which I filled. A year or two later I asked after the child, and was told that her father had taken her to his dentist, and he (the man who condemns first molars) had extracted all four of them. What is the result in her case? There are large spaces between the bicuspid, the second molars tip forward, and the whole articulation is defective. I hold in my hand the model of a similar case. Here, as you will observe, is a large lower jaw,—plenty of room for a full complement of teeth,—but the sixth-year molars were removed, and as a consequence the second bicuspid, have gone back against the second molars, leaving a space of nearly one-half an inch between the first and second bicuspid. Dentists, like other men, sometimes ride hobbies. This dentist's hobby seems to be the removal of sixth-year molars, and, irrespective of their condition or the development of the jaw, they are condemned.

When the question of extraction for the correction of irregularity presents itself, I study the child's features with as much interest as I would study a book. I look at the child's full face and then the profile, and endeavor to ascertain, if possible, what facial changes will be brought about if teeth are removed. A child's features may be ruined by the injudicious removal of certain teeth. In my judgment, more is lost than is gained by the removal of first molars.

With reference to permanent separations, I have little to say at this time. I can but consider them an abomination, and persons who have them in their mouths are as a rule made very uncomfortable by them.

Dr. J. T. Codman. I am interested in this subject, and have been

for many years. Not only is this paper unusual, but in my opinion no such paper has ever before been offered,—certainly not within my memory. I indorse this paper fully. The points are made with great clearness, and if they are not familiar to some of us, study and time will make them so. I have heard nothing about the length of time Dr. Davenport has been at work on this subject, but he has certainly given us the results of years of work and study. There is hardly any limit to what may be said upon these casts before us. They not only involve all that has been said of them, but a great deal more; not only the changes of facial expression, but the principles of contact, irregular contact, and the whole subject of articulation, in which I have taken the deepest interest. This is a very practical subject, and I think there is enough in these casts and drawings to engage our attention through many months with profit. Here you see certain results; they are fixed and definite,—the results of a combination of principles. They follow certain laws. The paper is very valuable, in that it describes the law of the arrangement and derangement of the dental arches in such cases. I have not the fear of contact that some who have spoken this evening evidently have. Indeed, I have gone to the other extreme. I am very much interested in what Dr. Clowes has said, and would like to see his results. I would like to ask him how long he has practiced his mode of separation; and whether he can show us, in the casts, good results from it? Can he show us the spaces still remaining and the teeth in good condition after twenty or thirty years? I once made the statement, and I make it again, for I think it is true, and one fact upsets all theories,—I do not think in this city of New York any old man can be found with a good set of teeth unless those teeth are in contact.

Dr. S. H. Guilford. I have come quite a distance to hear the paper of this evening read, and feel well repaid for my coming. The subject is one of great interest and importance, and I am pleased with the manner in which the writer has treated it. The extraction of certain teeth in order that the remaining ones may be benefited, is a practice full of good or evil according to the conditions under which it is done. Sometimes it results in great good, and at other times it is followed by very unfortunate results. Where the teeth of the child are large and crowding, with a tendency to decay on their approximal surfaces, the removal of a tooth or two back in the mouth will be attended with most happy results; but where the opposite condition prevails such extraction, with the tendency of the teeth to separate, lessens the mutual support of adjacent teeth, and often causes unsightly spaces between the anterior teeth. The best of judgment is necessary in deciding when and when not to so operate.



In regard to the removal of certain teeth to correct or prevent irregularity, we must again be governed by circumstances. If a very defective tooth be so situated that its removal will facilitate the alignment of the rest, we should not hesitate to extract it, and use the space thus created. So, also, if an otherwise complicated operation can be simplified by the removal of a sound tooth (back of the anterior ones), we will generally be justified in removing it. If, however, certain teeth have already been lost, or if the teeth are small in proportion to the size of the arch, we should rather spread the teeth, and thus make room for their accomodation. Indiscriminate or reckless extraction of teeth for any purpose cannot be too strongly condemned.

The evils attending the permanent separation of the teeth with the file or disk have been strongly brought out in the paper, and well illustrated by the diagrams. Such mutilation has always been practiced by some dentists, and after the promulgation of the Arthur method, in 1871, it became a very general practice, but the harm resulting from it soon became evident, and most dentists abandoned it forever. It seems most unfortunate that there are some who still hold to the practice. To my mind, judging from what I have experienced and seen, I consider it most reprehensible and inexcusable. I am happy to say that in the school with which I am connected, as well as those with which I am intimately acquainted, permanent separation of the teeth is condemned as bad practice.

The deformity alluded to in the paper, where the inferior incisors strike the gum inside of the superior ones, is generally due to the shortness or lack of full eruption of the molars. I am in the habit of correcting this condition by constructing a rubber plate to cover the arch, with a ledge on the anterior portion to receive the impact of the lower incisors. By thus preventing the occlusion of the bicuspids and molars, they will naturally elongate and finally touch, rendering the occlusion normal. Such plate should usually be worn a year in a child's mouth to accomplish the best results.

There is another condition that is difficult of correction. It is where the posterior teeth articulate and the anterior teeth do not, leaving a space between the upper and lower anterior teeth when the mouth is closed. That is an irregularity that is difficult to overcome, and it has never been decided how it can best be corrected. Probably the best plan is to grind off the molars, reducing their height, and if necessary devitalize their pulps. But certainly it should not be corrected by extraction.

I am glad that the paper laid stress upon the fact that where there is contraction of the arch extraction does not help it, but rather makes matters worse.

Dr. H. C. Meriam. I never attended a good dental meeting that I did not want to speak, and I never wanted to speak more than I do to-night.

Can we define the value of a tooth? A tooth is worth itself, the teeth with which it occludes, and all that they united can do for the organization. What are we laboring for? Our mission is not merely the filling of teeth; we are working in harmony with the medical profession for the preservation of function. Who shall say that Carlyle, with his crabbed disposition and writings, may not have been affected by the faulty working of some function? May not Byron's brain have been affected by the deformity of his foot? When we see such truths as are shown to-night, when we stand in the presence of so much life and force manifested, we realize that we are on holy ground.

Gentlemen, we must be humble when we look at those forces which may be set going by one wrong action on our part. Not long since I saw a lady who at eighteen years of age had the toothache, and the dentist whom she consulted extracted three lower molars on one side for that one toothache. That person was crippled for life for one single toothache! Is such dentistry a specialty of medicine? It makes one burn with indignation to hear such practice called dentistry, and such a man called a dentist.

Take this question of the extraction of the teeth at twelve, fifteen, or sixteen years of age. When does completion of a family type occur? Who shall answer this very important question? Some plants are biennial, some perennial, and some live a hundred years. Some nations mature early, and this is an important point to study. But we have no methods of measuring the forces working towards the completion of type in nature. I have the stump of a palm-tree cut from a greenhouse in my city because it had overgrown its accommodations. As those palm-leaves unfolded they carried before them and lifted the glass roof of the greenhouse. Think of the force a plant will exert and the force that causes the eruption of a cuspid. The extraction of molars from a normal arch allows the inferior incisors to come so far under the superior ones that, should "Riggs's disease" set in later in life, its treatment is made much more difficult. The teeth striking against inclined planes are subjected to a slight movement, where absolute firmness is required. I have one case where the molars have been lost, and the incisors were carried back and crowded so that there is now no septum at all, You all know that the scaling of tarter in such cases is very difficult.

This paper points out to us the harmony and order of creation, and our study of it should teach us to preserve, not to mar or destroy. We should remember that when man was made he was declared

good, then we can see the position taken by the author of this paper. We must not forget function and order. Think of the meaning of the word molar,—from *molaris*, a mill. What mill would grind if its wheels were not at true bearing?

I hope that this paper, with all its illustrations and casts referred to by its author, will be preserved in separate form, that it may be in the hands of every earnest worker amongst us.

Dr. Carl Heitzmann. The dentist who would try to prevent future disease by extracting a tooth plays Providence, and we all know this is a dangerous play. Suppose a physician should say to the parents of a baby, "The baby has a little toe; that toe in years to come may have a corn upon it; or when this baby is a very old man, that toe may become the seat of senile gangrene; therefore let us cut it off!" What would you think of the surgeon? This is playing Providence.

Some years ago I was present at a discussion where this question of separation came up, and I am surprised that your profession has not made more headway in eight years than my professional brothers did in surgery, medicine, and gynecology. I feel quite at home here in listening to the discussion of the most elementary points, or A B C of dentistry, because it reminds me of our imbecility in all branches of medicine. You are just as frail and weak as physicians are in general.

I have been very much interested in the paper read and the drawings exhibited, but not from a strictly dental point of view. I would like to object to one remark of Dr. Davenport's, which goes so far as to state that the enamel is destitute of sensibility, and that it simply serves as a shield for a more complicated, more animated and vitalized structure, by which the dentine is meant. Very few dentists to-day will maintain that the enamel is destitute of sensibility. I do not believe it. From what I have felt in my own teeth, and what I have seen under the microscope, I must object to the statement that the enamel is less vitalized and less complicated in structure than the dentine. It is very complicated indeed. We in New York are all the time proving the life of the enamel; and I would be sorry to see the Paris dentists work against us.

The most interesting part of this paper is the biological part. Gentlemen, do you realize that, when teeth are extracted, not only will the jaws by and by change their configuration, but even the countenance and the expression of the face will change? If a Philadelphia dentist is able by looking at a man's face on the street to tell that the unfortunate being had been maltreated some years before in the extraction of certain teeth, it proves that the bone is a living tissue. It is only a comparatively short time—fifteen or



sixteen years—since it was maintained that the bones all through are living structures. In former years it was believed that the bones were composed of calcareous matter merely,—glue-yielding substance,—with cavities that carry liquids or gaseous material. Afterwards it was proved that those cavities contained protoplasm. In 1873 I was the first one to prove that not only the bone-corpuscles, but the whole basis-substance, was alive all through, so long as the bone as a whole is alive.

I admire the skill with which this paper is made up, mainly from a practical stand-point; but let me be the advocate of further scientific research in this line, even if it were a little less practical. The cause of the many changes in bone-tissue which lead to the disfigurement of the jaws and the facial bones in general should be found out. There can be no question but that where there is action there is reaction, and where action is lacking reaction will be lacking. The bones are made up of rods or pillars, and if a pillar is out of action, if no pressure is exerted upon it, it will atrophy. There is a change going on which leads to absorption, but not directly from the hard tissue called bone. This tissue must first fall back to the soft, elementary, embryonal condition; it at last becomes medullary tissue, and as such will be the subject of absorption. If you examine the jaw of a person eighty or ninety years old under the microscope, you will find that such a jaw is scarcely more than a thin ledge, for when the teeth have fallen out the jaws are more or less absorbed. What happens in and around the socket of a tooth after the latter is extracted? The microscope is destined to settle such questions, and the more attention given to scientific research of this kind, with the aid of the microscope, the greater will be the progress in the wonderful department of dentistry.

Dr. E. S. Niles. I have been greatly interested to-night in the paper, concerning the preparation of which I heard some eighteen months ago, and knowing Dr. Davenport in his early years of study I greatly desired to hear his conclusions. Personally I wish to thank him for this production, and for the great amount of labor that he has expended in preparing himself upon this subject, of which there is so little record in the profession. I may say that Dr. Davenport has but stepped over the threshold into a field in which there is room for a vast amount of observation. He has done what he could, and if there are in coming generations, or in our generation, other men who are willing to devote the same amount of time to a continuation of this subject, they will do more for dentistry than we have done. There is a feature of the subject which Prof. Heitzmann has lightly touched upon, and that is the change that takes place in the jaw itself. We are taught that in childhood

the jaw has a certain form, that as it develops to manhood it assumes another form of perfect development, and that from that point to old age it gradually goes back again to the form of childhood. These gradual changes Dr. Davenport has not taken into consideration in his presentation of this subject.

It is hardly fair for a person to attempt to discuss a paper like this on the spur of the moment, and I wish it understood that, out of respect to the writer, what I say is said without study, and perhaps I ought not to criticise his paper at all. There are, however, a number of conditions which have presented themselves to me, which he has not brought out, and which might conflict with his deductions. A great number of changes may or may not take place, according to circumstances, and as the subject has been brought before me I have realized my inability to foretell what would be the result of certain operations. There are no two mouths in which the forces are alike, except possibly the perfect arrangement; and to lay down arbitrary rules seems to me almost pernicious.

A feature of the paper which comes out very strongly, is the occlusion of a perfect or normal arch or denture. The diagrams illustrate that most admirably, and it certainly brings to my mind something entirely new; also, the changes that take place after the extraction of the sixth-year molars.

Vice-President Howe. Dr. Atkinson, may we not hear from you?

Dr. W. H. Atkinson. I suppose it would be discourtesy if I were not to speak when my name is called; but I think it is wicked to consume the time of a body without showing better than we now can that we understand what we are talking about. Most of the discussion has not been a discussion of the paper at all. The paper has some statements that ought to be dealt with, but it is too long a paper to do justice to in a single evening. I excuse it for being one-sided, because we cannot be all-sided. Let those men who have seen results satisfactory to them from the practice of separation and extraction do half as much as Dr. Davenport has done, and they will find more attentive listeners; they will find, too, that their failures exceed their successes, in my judgment, in a very heavy ratio. I know that we have but a very small knowledge of what function is and what derangements are. But my mind runs back to a host of cases where I have seen excellent teeth that were not separated, that had been used vigorously, and were worn down on the joining faces so that the worn facets slabbed together, and they were without a particle of decay. When men talk about contact being dangerous, they had better study anatomy, and look at the teeth in skulls that are to be found in almost any museum.

I hope this subject will have attracted attention enough to induce

us to examine it and see whether we are competent to pass an opinion upon it. I think this paper is a great step in advance. I admire it exceedingly; and with the exception of some nominations in histology and classification, I do not recall a single objection to it. So far as the principles involved are concerned, I think they are founded in nature and in mechanics; they are true to nature and biological law. That we know all about decay, I do not believe. Neither do I believe that the Creator ever contemplated having the baby mouth of a certain form, the adult mouth of another form, and the return of that adult form to the baby form again. The only sameness between the infant mouth and the senile mouth is that they are both without teeth. I am a pretty good chunk of a baby myself, and yet I can crack my teeth together and you can see whether my jaws are out of line.

Dr. Norman W. Kingsley. It is not at all essential to our health or comfort that every tooth in the mouth should be preserved, or that their articulation and occlusion should be absolutely perfect. Look into the mouths of patients that come into your hands, and in nine-tenths of them you can tell in a moment on which side of the mouth they are masticating. Think of your own experience; most of you are chewing on one side only, but you are masticating your food sufficiently and all that your health requires. It is only an evidence of the abundant provision of nature. Nature is everywhere prolific and extravagant, producing a superabundance as a provision against the failure of some. Look at the hairs on our heads; we can lose a good many hairs and still have enough left. Dr. Heitzmann's illustration, in which he compares the toes of the feet and the teeth in the mouth, is absurd. Every toe on each foot is needed, but every tooth in the mouth is not needed. These are facts which we know not only by every-day observation, but we know by personal experience. I have lost a number of teeth, but for all that I can masticate every particle of food just as thoroughly and fully as I ever did in my life. At the same time I am not going to advocate the indiscriminate extraction of teeth. I was pleased with Dr. Guilford's remarks about the removal of certain teeth for the correction of irregularity. What he said is, in my opinion, eminently true. But to say that we never should extract a tooth for the benefit of other teeth, is a doctrine I cannot accept.

Dr. C. T. Stockwell. I hoped that I should not be called upon, for there are special reasons why I shall be unable to make even an apology for a speech to-night. There are, however, one or two thoughts that I would like to express on this occasion. I am exceedingly glad, and consider myself indeed fortunate, that it is my privilege to listen to the reading of this very able, interesting, and



instructive paper. I had understood that such a paper was being prepared, and was in store for us on some favorable occasion. Having known the author more or less intimately, some years since, I felt sure that the subject would be handled in an able and scientific way. Consequently I have looked forward to the time of its presentation with no little interest. To say that I have no sense of disappointment at this moment, is stating my estimation of the paper very mildly. I expected much, and all of us evidently agree in the opinion that we *have* much. We certainly have much here to incite thought, much material to study, and much, I apprehend, that will be found difficult to overthrow or ignore.

Facts are stubborn things to argue with, and until the opponents of the author's views can bring forward a like array of facts in support of their ideas, I fail to see how they can avoid the conclusion that they have been placed on the defensive. In any event, I must admit that this is my own feeling to-night, for I have heretofore been an advocate of the theory that crowded arches may be benefited by a judicious removal of teeth. I have, however, never resorted to filing in order to secure space between approximating teeth.

We all must feel that it is utterly impossible to *discuss* such a paper as this after simply hearing it read. It will require a good deal of study before an intelligent discussion is possible.

There is only one other thought in regard to the paper that I wish to notice at this time. I am always somewhat suspicious of anything that seems like an arbitrary adoption of any method or system. Systems are, like creeds, at best but the formulation or classification of men's opinions, and consequently fall short of compassing the whole truth with which they attempt to deal. And so, with this question, as with all others, I believe in pure eclecticism.

From the extreme position of the author's conclusions—that in no case should extraction be resorted to if the best results are to be gained—I should dissent. But that this paper is to have an historic interest, and also be the means of bringing about a revolution in the practice of a large number in the profession, causing a more scientific study and understanding of the laws and principles that underlie the treatment of such cases, there can be no doubt.

I congratulate this society that it should have been chosen as the medium through which so important a paper shall be presented to the scientific world.

Dr. Bogue. If the gentlemen who are the visitors and guests of the society have said what they have to say, I have a few words to add which I think will embody much of Dr. Davenport's own views. Prof. Darby has told us of his ability to recognize the patients of a

certain Philadelphia dentist, who extracts the superior cuspids to correct irregularity, by the peculiar expression about the mouth, caused by such loss. I think that in the majority of instances it is possible to detect the absence of any considerable number of teeth, whether they be molars or bicuspid, but more particularly the sixth-year molars. One of the ideas that was prominently presented in the paper was that the sixth-year molar, standing at the bottom of the upper arch, viewed horizontally, and being an independent tooth in its formation, having a germ separate and apart from all the other twenty-eight, and standing as the support of the two jaws during the process of the development of the permanent teeth and the shedding of the deciduous ones, occupies such a position that if it is removed the jaws approximate, and the nose and chin approximate to a greater extent than would follow the extraction of any other four teeth, or any other six teeth, in the mouth. The extraction of those teeth invariably, if my observation is correct, detracts from the strength and nobility and grandeur of the human countenance. I can look around this room now and see gentlemen who have lost their sixth-year molars. Not that it can always be detected, but in a great many instances it can be; and a man's nobility and force and strength are in appearance diminished by the loss of those teeth. Dr. Kingsley says, "Look at yourself." Well, I am looking at myself. On the right side I have lost two teeth. I am lame, and have been for twenty-five years. On my left side I was lame, where one of my confrères, now gone to heaven, used his file or chisel. For a year and a half I remembered him, until the tooth was contoured. Dr. Davenport has been similarly treated on both sides of his mouth, and he too looked at himself in his paper.

That abundant provision has been made for mastication, even with the loss of some of our teeth, may be true, but I should not put such stress upon "abundant." Nature does assist a man to get along even with the loss of a very considerable portion of his anatomy. Indeed, it is reported that the patient survived when a certain eminent surgeon had completed some operations so extensive that his assistant said to him, "Which part shall I put back to bed, sir?" A man *can* live without legs or arms, and so he can live with store teeth; not even artificial ones, but false teeth; but is he *best* in that condition?

The underlying thought of the paper, as I understand it, is not the thought of dollars and cents in any way; it is an inquiry as to what is absolutely best for the patient, and I have been glad that only indirectly has the question of expediency entered into the discussion to-night. The question has been taken up on the ground of high art; what is absolutely best, not what is always attainable

We know that upon the battle-field amputations take place necessarily that would never be permitted in private practice; yet those amputations are the proper things under the circumstances.

The question has been raised, Where do we see these full mouths of thirty-two teeth?

Dr. John B. Rich. That question will be answered probably by saying that the teeth are found to be good in nations that live nearer to a condition of nature, where civilization and a more artificial life has not extended. In such regions we have more perfect types of men than are found in civilized communities. That is a well-known fact. I have seen splendid dentures among savage tribes.

Dr. Bogue. Some years ago I was dining with Dr. Abbott, in Berlin. He said to me, "The teeth of the German nobility are singularly like American teeth; I can whittle most of them right down." The bread they eat there is peculiarly white and nice. Shortly after that, when I was roaming around Germany, my driver pulled out from under the seat a loaf of black bread that they call "pumpernickel," cut off with his jack-knife a piece and fed it to his horse, and then cut off another piece and fed himself. This man and those of his class generally are provided with fine teeth; short, yellow, and dense. I think that the difference between white bread and its concomitants and pumpernickel with its surroundings has something to do with the different conditions of teeth.

I find in Europe one class of men corresponding with those Dr. Rich has in mind, who have splendid teeth. The pampered class have teeth like those of the Americans; the lower class have splendid teeth, like the Indians. That is perfectly correct. But there is another class that take care of their teeth and try to keep them clean, a class which is gently bred and nurtured, often fed by a French cook, who also preserve their teeth.

Dr. Rich. It is true that where everything is brought to bear upon the proper development of human society,—whether from living in a natural manner or whether in a high state of cultivation, a great part of their time is spent upon personal development,—that there we have a right to expect the most perfect physical organization. No doubt in some races of nobles we do find that, where much exercise is taken in the open air and they have everything at command, it is conducive to a high condition of health. Among French nobility and the nobility of England we find such, and they have splendid dental development as well as the finest physical development. But that is an exception. As a rule the most splendid dental development is always found among the people who live the farthest away from civilization, among savage or semi-savage races.



I do not want it understood that my remarks have any relation to Dr. Davenport's paper. I should not presume to make any remarks upon a paper like that until after long study of the paper and the diagrams. I do not think any of us should undertake to discuss such a paper, embracing years of research, without careful study.

Dr. Dwinelle. Mr. President, I would move that a vote of thanks be extended to Dr. Davenport across the water for his very able paper. We certainly can see, whether we agree with him in all particulars or not, that it is a grand paper, involving principles that we must recognize. We would show Dr. Davenport our appreciation of his work, and do what we can to stimulate him to pursue the subject still further.

Dr. Meriam. As one of your guests, I ask the privilege of seconding the motion.

Dr. Niles. I would suggest that the vote of thanks be extended to him in behalf of the profession of the United States. This paper will probably be sent broadcast through the usual channels of this society, and I think the whole profession of the United States will feel indebted to Dr. Davenport.

The motion was carried unanimously.

Adjourned.

S. E. DAVENPORT, D.D.S., M.D.S.,  
*Editor N. Y. Odontological Society.*

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### LAKE ERIE DENTAL ASSOCIATION.

THE twenty-fourth annual meeting of the Lake Erie Dental Association was held in Meadville, Pa., May 3, 1887, and proved both interesting and profitable to the members and visitors. The papers read were numerous, embraced many topics of current interest, and were freely and thoughtfully discussed. We have no abstracts of the papers or remarks, but have been furnished with the following report:

Dr. See stated that in Vol. I, No. 3, of the *Dental Review*, published in Chicago, the following "query" appeared:

*To the Editor of the Dental Review:*

Sir: I wish some advice about the treatment of the antrum. I have a case where an abscess from the second bicuspid discharged into the antrum, and after the extraction of the root pus continues to flow from the opening. What treatment should be adopted?—D. D. S., Meadville, Pa.

Dr. See further stated that he had written to the *Dental Review* asking for the name of the correspondent, if the communication was genuine, and if not genuine, that a statement be published in the next number stating that the query was not written by anyone

entitled to the degree of D.D.S. residing in Meadville, Pa. A reply was received stating that the communication was not genuine, and that the editor declined to make any amends for the injustice done. Dr. See asked that a committee of three be appointed to examine the publication and the correspondence between himself and Dr. A. W. Harlan, the editor, on the subject, said committee to report by resolution or otherwise.

The president appointed Drs. Wolfe, D. D. Magill, and J. A. Todd as said committee, who subsequently reported as follows:

We, your committee appointed to take into consideration the matter complained of by Dr. See, find that the communication originated in the office of the *Dental Review*. We find the matter complained of, from the evidence presented, to be true; and therefore we wish to offer the following:

*Whereas*, Dr. See feels aggrieved by said publication, and has written to the editor of said journal, and the reply received from said editor is of so evasive and unsatisfactory a nature that we deem it but justice to Dr. See and the profession at large that the facts in this case be made public; therefore,

*Resolved*, That the publication of the query in question was an act unprofessional toward a brother dentist, and beneath the dignity of respectable journalism, and that the secretary furnish a copy of this report to the dental journals for publication.

E. M. WOLFE,	} Committee.
D. D. MAGILL,	
J. A. TODD,	

The officers for the ensuing year are: M. H. Fetzner, president; M. B. Narramore, vice-president; J. H. Heivly, treasurer; C. D. Elliott, secretary; F. H. Whitesides, C. W. Green, and Cyrus See, board of censors; Cyrus See, George Elliott, F. Herrick, E. M. Wolfe, and F. H. Abell, executive committee.

Meadville was selected as the place of the next quarter-centennial meeting, and a general invitation was extended to the profession.

#### AMERICAN MEDICAL ASSOCIATION—RESOLUTION.

At the recent session of the American Medical Association the following resolution, introduced by Dr. N. S. Davis, was adopted by a unanimous vote:

*Resolved*, That the regular graduates of such dental and oral schools and colleges as require of their students a standard of preliminary or general education and a term of professional study equal to the best class of the medical colleges of this country, and embrace in their curriculum all the fundamental branches of medicine, differing chiefly by substituting practical and clinical instruction in dental and oral medicine and surgery in place of practical and clinical instruction in general medicine and surgery, be recognized as members of the regular profession of medicine, and eligible to membership in this association on the same conditions and subject to the same regulations as other members.

Dr. Davis, in introducing the resolution, said he wished to ex-

plain its object: There are two objects to be had in view. First, to relieve a degree of embarrassment that exists between the regular profession as we consider it and the profession of dentistry. The department of dental and oral surgery is a part of the profession of medicine as much as the department of ophthalmology, or otology, or any other 'ology. Our mouths and teeth are parts of our system as much as any other part, and are used more than any other part. The embarrassment is this, that in the early history of dentistry it was but little if anything more than a mere mechanical pursuit. Steadily it has advanced, and in years gone by—quite a number of years ago—our lamented S. D. Gross made a proposition that an Oral and Dental Section be provided as a section in this association. It was seconded by Dr. Sayre and myself, and it was organized. The International Medical Congress of 1881 provided a section for Dental and Oral Surgery. The Congress to be held in Washington has done the same thing, and it will be one of the most thorough and best organized sections in the Congress. There is an embarrassment in this respect. It is to know just who and by what line of demarkation those engaged in that department shall be recognized as members of the regular profession. Now it is proposed to make a line, and draw it where this resolution says, that all those who are qualified by general education and a term of study equal to the best medical colleges, a curriculum embracing the entire fundamental principles of medicine, with the provision that, instead of special instruction in clinical surgery, instruction may be had in dental and oral surgery, such shall be recognized as members of the profession of medicine. It will take away a sort of embarrassment. There is a more far-reaching and more valuable underlying object in this resolution, and that is that to be recognized as a member of the profession, if this resolution is adopted by this body, they must have the education received in schools that call for these requirements. It makes a strong lever to lift up the course of study in the dental schools. Such are my reasons for bringing up the resolution. I will say nothing more on the subject.

E. S. TALBOT, *Secretary*,  
Section on Dental and Oral Surgery, A. M. A.

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#### FIRST DISTRICT DENTAL SOCIETY, STATE OF NEW YORK.

THE following resolutions were adopted by the First District Dental Society of the State of New York, at a regular meeting held in New York City, Tuesday evening, June 7, 1887:

WHEREAS, Members of this society are threatened with suits for damages and injunctions, if certain letters patent for alleged improvements in dentistry are



not recognized, the validity of which has been gravely questioned, and the right to use is wholly refused, or terms and conditions imposed which would be a heavy tax upon the profession and the community for many years; and

WHEREAS, It would be unjust for one or two members to bear the labor and heavy expense attendant upon determining how far the pretensions of such patentees ought to be respected; therefore,

*Resolved*, That each member of this society be requested to contribute five dollars to the treasurer, towards a protective litigation fund, to be expended as the officers of the society or a special committee direct.

*Resolved*, That a copy of these resolutions be sent to other dental societies, with a suggestion of the imperative necessity of financial coöperation, if effective resistance is to be made to the preposterous demands now made upon dentists by patentees.

W. W. WALKER, *President*.

The above resolutions were also adopted by the American Academy of Dental Surgery of New Jersey, at a special meeting held at Newark, June 9, 1887.

#### NORTH CAROLINA STATE DENTAL ASSOCIATION.

THE thirteenth annual meeting of the North Carolina State Dental Association was held at Morehead City, N. C., June 7, 8, and 9, 1887. The meeting was well attended, and its proceedings were of great interest.

The following officers were elected for the ensuing year: T. M. Hunter, president; Sid. P. Hilliard, first vice-president; C. L. Alexander, second vice-president; H. C. Herring, secretary, and J. W. Hunter, treasurer. The president appointed on the executive committee the following gentlemen: V. E. Turner, chairman, J. E. Mathews, and B. H. Douglas.

The next meeting will be held in Raleigh, N. C., beginning on the last Tuesday in May, 1888.

H. C. HERRING, *Secretary*,  
Concord, N. C.

#### SIXTH DISTRICT DENTAL SOCIETY, STATE OF NEW YORK.

THE Sixth District Dental Society of the State of New York held its eighteenth annual meeting in Binghamton, N. Y., Tuesday, May 10, 1887.

The following officers were elected for the ensuing year: E. D. Downs, president; M. H. Fish, vice-president; Myron D. Jewell, secretary; F. B. Darby, treasurer; A. M. Holmes, censor; delegates to the State Society for four years, M. H. Fish and G. H. Smith.

MYRON D. JEWELL, *Secretary*,  
Richfield Springs, N. Y.

## MINNEAPOLIS DENTAL SOCIETY.

THE sixth annual meeting of the Minneapolis City Dental Society was held at the office of Drs. Bowman, Weeks and Jenison, Minneapolis, Minn.

The following officers were elected: M. G. Jenison, president; E. H. Angle, vice-president; E. F. Clark, secretary, and F. H. Brimmer, treasurer.

E. F. CLARK, *Secretary*,  
No. 239 Nicollet Av., Minneapolis, Minn.

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## AMERICAN DENTAL ASSOCIATION.

THE twenty-seventh annual meeting of the American Dental Association will be held at Niagara Falls, commencing Tuesday, August 2, 1887.

The officers having decided to change the place of meeting from Asheville, N. C., to Niagara Falls, it is hoped that we may have a large attendance. The principal reasons for making the change were, that many dentists residing in the South desired to attend the meeting of the Southern Dental Association, and also the International Medical Congress, to be held in Washington, D. C., September 5, 1887, both gatherings coming close together. The American Dental Association would, they thought, have a larger meeting in the North this year than would be the case had they gone to Asheville. Next year the association may meet in the South, when it is believed we will have many accessions to our ranks.

All are especially urged to be present at Niagara, and help to make this one of the best meetings ever held by the association. Arrangements are being made with railroads and hotels to secure their best rates.

W. W. ALLPORT, *President*,  
GEO. H. CUSHING, *Recording Secretary*,  
A. W. HARLAN, *Corresponding Secretary*.

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## SOUTHERN DENTAL ASSOCIATION.

THE Southern Dental Association will hold its thirteenth annual meeting at the Hygeia Hotel, Old Point Comfort, Va., beginning Tuesday, August 30, 1887, at 10 o'clock A. M.

All the indications point to a very large, interesting, and profitable meeting. The place of meeting is one of the most delightful, attractive, and healthful resorts on the Atlantic Coast, abounding in scenes of beauty and historic interest. It is accessible by rail to all parts of the country. The Hygeia is admirably adapted for a

dental association meeting, having large, cool, quiet meeting rooms, with perfect acoustic properties. The clinic and exhibition rooms are well lighted and ventilated. The arrangements for clinics we expect to be the most perfect, giving opportunity for all who desire to see the operations with comfort, without interfering with the convenience of the operators.

The Virginia State Dental Association will meet at the same time and place, and will extend a cordial welcome to all who attend. They will leave nothing undone for the comfort and convenience of their guests.

A special steamer has been chartered to convey the association and our guests to Washington, Saturday, September 3, in time for the meeting of the International Medical Congress. The foreign delegates to the International Congress are specially invited to attend and take part in our proceedings.

Reduced railroad rates have been secured. Hotel rates, for those attending the meeting and their families, reduced to \$2.50 per day; regular rates from \$3.50 to \$12.00 per day.

All dentists and medical men are cordially invited, and will receive a hearty welcome. For further information, address

J. HALL MOORE, *Chairman Executive Committee*,  
104 North Ninth street, Richmond, Va.

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### AMERICAN DENTAL SOCIETY OF EUROPE.

THE annual meeting of the American Dental Society of Europe will be held at the Hotel Zum Riesen, Coblenz, beginning on Thursday, September 1, 1887, and continuing for two or three days.

The work has been divided this year into sections, which will report in the following order, viz:

- I. Operative Dentistry, Charles Kingsley, chairman.
- II. Dental Materia Medica, Wm. St. George Elliott, chairman.
- III. Prosthetic Dentistry, W. M. Patton, chairman.
- IV. Dental Education, Geo. Cunningham, chairman.
- V. Dental Pathology and Histology, W. D. Miller, chairman.

Clinics illustrating various methods of operating may be expected. There will be an exhibition of instruments and of models and appliances for plate-work and regulating cases.

Gentlemen who design contributing papers, and who have not already sent in the titles of their essays, are requested to communicate them to

E. P. GEORGE, *President*,  
5 Marien Str., Frankfort A-M.



## NATIONAL ASSOCIATION OF DENTAL FACULTIES.

THE National Association of Dental Faculties will meet at the Ebbitt House, Washington, D. C., on Saturday, September 3, 1887, at 10 A. M. By order of the Executive Committee.

C. N. PEIRCE, *President*,  
No. 1415 Walnut street, Philadelphia, Pa.

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## NATIONAL ASSOCIATION OF DENTAL EXAMINERS.

THE annual meeting of the National Association of Dental Examiners will be held at Niagara Falls, on Monday, August 1, 1887, at 3 P. M.

FRED. A. LEVY, *Secretary*,  
Orange, N. J.

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## PENNSYLVANIA STATE DENTAL SOCIETY.

THE nineteenth annual meeting of the Pennsylvania State Dental Society will be held at Glen Summit, Pa., commencing Tuesday, July 26, 1887, at 10 A. M.

Rates at hotel, \$2.50 per day. Orders for tickets or general information may be had by addressing

W. H. FUNDENBERG, *Cor. Secretary*,  
No. 958 Penn ave., Pittsburg, Pa.

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## NEW JERSEY STATE DENTAL SOCIETY.

THE seventeenth annual meeting of the New Jersey State Dental Society will be held at the Coleman House, Asbury Park, N. J., on July 20, 21, and 22, 1887.

It is expected to be the largest meeting ever held by the society. Many interesting papers, by eminent gentlemen in the profession throughout the country, will be read. The clinics will constitute one of the most interesting adjuncts of the meeting, some twenty of the most skilled in the profession having made arrangements to attend.

Board will be \$2.50 and \$3.00 per day, the hotel accommodations being first-class.

The secretary will mail programmes to all desiring them, and members of the profession generally are cordially invited to attend.

CHARLES A. MEEKER, *Secretary*,  
No. 27 Fulton street, Newark, N. J.

**CONNECTICUT VALLEY DENTAL SOCIETY.**

A CORDIAL invitation is extended to the profession to attend our next meeting, at Windsor Hotel, Montreal, Canada, July 19 to 22 inclusive.

Round trip rates from stations on the Grand Trunk Railroad at one and one-third fare; Central Vermont Railroad, free return tickets; Connecticut River Railroad, round trip from Springfield \$12.00, from Northampton and Greenfield \$11.50, Brattleboro \$10.75, and Bellows Falls \$10.00. Parties going from New York get a regular ticket to Springfield, and excursion from there, making the cost of the round trip from New York \$17.44. These tickets are good going from July 16 to 20, returning until August 13. Parties going from Boston get regular excursion ticket at \$16.00.

An excursion has been arranged (after the close of the meeting) to Quebec and the Saguenay, visiting Ha Ha Bay and Chicoutimi; round trip from Montreal, \$13.34.

Rates at the Windsor reduced to \$3.00 and \$3.50 per day.

By notifying the secretary, much trouble will be averted in regard to securing rooms, examination of baggage, etc.

GEO. A. MAXFIELD, D.D.S., *Secretary*,  
Holyoke, Mass.

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**VIRGINIA STATE DENTAL ASSOCIATION.**

THE eighteenth annual meeting of the Virginia State Dental Association will be held at the Hygeia Hotel, Old Point Comfort, Va., beginning Monday, August 29, 1887, at 10 o'clock A. M.

The first day's session will be devoted to routine business, after which the association will hold joint sessions with the Southern Dental Association, which meets on Tuesday, the 30th.

Reduced railroad and hotel rates have been secured.

The State Board of Examiners will meet at the same time and place.

A cordial welcome to all dentists and medical men.

J. HALL MOORE, *Corresponding Secretary*,  
104 North Ninth street, Richmond, Va.

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**NORTHWESTERN DENTAL ASSOCIATION.**

THE Northwestern Dental Association will hold its fifth annual meeting at Fargo, Dakota, on Tuesday and Wednesday, July 26 and 27, 1887.

S. J. HILL, *Secretary*, Fargo, Dak.

**WISCONSIN STATE DENTAL SOCIETY.**

THE Wisconsin State Dental Society will hold its seventeenth annual meeting at Milwaukee, Wis., beginning Tuesday, July 19, 1887, and continuing for three days.

The State Board of Dental Examiners will meet daily during the sessions to examine and register applicants.

Dental and medical practitioners are cordially invited to attend.

W. S. SULLIVAN, D.D.S., *Secretary*,  
23 E. Main St., Madison, Wis.

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**MINNESOTA BOARD OF DENTAL EXAMINERS.**

THE Minnesota State Board of Dental Examiners will meet at the Nicollet House, Minneapolis, Minn., at 9 A. M., Tuesday, July 12, 1887 (the day preceding the session of the Minnesota State Dental Society).

C. W. MERRY, *Secretary*, Stillwater, Minn.

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**EDITORIAL.****RESOLUTION OF THE AMERICAN MEDICAL ASSOCIATION.**

WE call attention to the resolution adopted by the American Medical Association published among the society reports in this issue. It will be seen that this action places regular graduates of dental colleges which meet certain specific requirements upon a footing with members of the medical profession so far as eligibility to membership in that body is concerned.

It has been assumed that this opens the doors of the International Medical Congress to all such dental graduates, in accordance with the provision that "the Congress will consist of such members of the regular medical profession . . . and of such other scientific men," etc.

Recognition of dentists by the American Medical Association as entitled to membership in that body does not, however, make them "members of the regular medical profession," and how this question will be viewed by the Executive Committee of the Congress is problematical, but will probably be known before our next issue.

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**AMERICAN DENTAL ASSOCIATION.**

It will be seen by the official announcement on another page, from the president and secretaries of the American Dental Association, that the place of meeting has been changed from Asheville, N. C., to Niagara Falls, at which place the meeting will be held as per adjournment, Tuesday, August 2, 1887. Under all the circumstances this seems to have been a judicious change of programme.



## DENTAL MICROSCOPY AT THE MEDICAL CONGRESS.

GENTLEMEN who may be desirous of exhibiting anything microscopically in connection with the mouth and teeth, before the Dental Section of the International Medical Congress at Washington in September, are requested by Dr. Frank Abbott, chairman of the Committee on Microscopy, to communicate with him at No. 22 West Fortieth street, New York, N. Y.

## ALABAMA DENTAL LAW.

FOLLOWING is the text of "an act to regulate the practice of dentistry in the State of Alabama," as amended and approved February 28, 1887:

SECTION 1. Be it enacted by the General Assembly of Alabama, That from and after the passage of this act it shall be unlawful for any person to engage in the practice of dentistry in the State of Alabama, unless said person has obtained license from a board of dental examiners duly authorized and appointed by this act to issue such license; provided, that dentists who have been in the regular practice of dentistry for five years next preceding the passage of this act shall not be required to submit to an examination, and shall be entitled to license without fee, which shall be transmitted to him by mail, or otherwise, upon his application, accompanied by an affidavit to the fact of his having been in practice for the required time.

SEC. 2. Be it further enacted, That the board of dental examiners shall consist of five (5) dental graduates, or practitioners of dentistry, who have obtained a license to practice dentistry from a dental board organized under this act, and who are members in good standing of the Alabama Dental Association; provided, that said graduates or practitioners have been practicing dentistry in the State of Alabama for a period not less than three (3) years.

SEC. 3. Be it further enacted, That it shall be the duty of said Alabama Dental Association, at its annual meeting in April, 1887, to elect said Board of Dental Examiners, whose terms of office shall be respectively five, four, three, two, and one years, in the order in which they are elected; and at each annual meeting of said association thereafter one member shall be elected to fill such vacancy, who shall serve for the period of five years. The president shall have power to fill all vacancies in said board for unexpired terms.

SEC. 4. Be it further enacted, That it shall be the duty of said board of examiners—

1st. To meet annually at the time and place of meeting of the Alabama Dental Association, or oftener, at the call of any three members of the board. Thirty days' notice must be given of the time and place of meeting of said board, said notice to be mailed to all practicing dentists in the State.

2d. To prescribe a course of reading for those who study dentistry under private instruction.

3d. To grant license to all applicants who undergo a satisfactory examination, who shall pay to the said board a fee of five dollars for said license.

4th. To keep a book in which shall be registered the names of all persons licensed to practice dentistry in this State.

SEC. 5. Be it further enacted, That the book so kept shall be a book of record, and a transcript from it certified to by the officer who has it in keeping, with the common seal of said board, shall be evidence in any court of this State.

SEC. 6. Be it further enacted, That three members of said board shall constitute a quorum for the transaction of business, and should a quorum not be present on the day appointed for its meeting, those present may adjourn from day to day until a quorum is present.

SEC. 7. Be it further enacted, That one member of said board may grant a license for an application to practice until the next regular meeting of the board, when he shall report the fact, at which time the temporary license shall expire, but such temporary license shall not be granted by a member of the board after the board has rejected the applicant.

SEC. 8. Be it further enacted, That any person who shall, in violation of this act, practice dentistry in this State, shall be liable to indictment, and, on conviction, shall be fined not less than fifty nor more than three hundred dollars; provided, that nothing in this act shall be construed to prevent persons from extracting teeth; provided, that nothing in this act shall be so construed as to require any person who is now lawfully engaged in the practice of dentistry to procure any additional license or to attend any meeting or meetings of the State Dental Association.

SEC. 9. Be it further enacted, That on the trial of such indictment it shall be incumbent upon the defendant, to exempt him from the penalties of this act, to show that he has authority under the law to practice dentistry in this State.

SEC. 10. Be it further enacted, That every person to whom license is issued by said board of examiners shall, within thirty days from date thereof, present the same to the judge of the probate court of the county in which he resides, who shall officially endorse said license and seal it with the seal of the court, and who shall record said license in a book in his office, and who shall be entitled to a fee of one (1) dollar for his services; but a temporary license issued under section 7 of this act need not be sealed or recorded.

SEC. 11. Be it further enacted, That it shall be the duty of the solicitors of this State to prosecute all persons violating all or any portion of this act.

SEC. 12. Be it further enacted, That all laws or parts of laws in conflict with this act be and the same are hereby repealed.

Dr. E. S. Chisholm, of the Board of Dental Examiners, writes us as follows in reference to this law: "The five-year clause may be misconstrued, as that clause is interpreted by our board to be only the original law, and went into effect on the 11th of February, 1881. At the present time it dates the 28th of February, 1887. In other words, a dentist must have been continuously in practice five years preceding the 11th day of February, 1881, to get a license now from the board on grounds of five years' practice."

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#### ARKANSAS DENTAL LAW.

FOLLOWING is the text of "an act to regulate the practice of dentistry, and punish violators thereof," in the State of Arkansas, which was approved by the Governor and became a law on the 2d of April, 1887:

*Be it enacted by the State of Arkansas :*

SECTION 1. That it shall be unlawful for any person to practice, or to attempt to practice, dentistry or dental surgery in the State of Arkansas without first having received a certificate from the board of dental examiners.

SEC. 2. A board of examiners, consisting of five practicing dentists, residents of this State, is hereby created, who shall have authority to issue certificates to persons in the practice of dentistry or dental surgery in this State at the time of the passage of this act, and also to decide upon the validity of such diplomas as may be subsequently presented for registration, as hereinafter provided.

SEC. 3. The members of said board shall be appointed by the Governor, and shall serve for a term of four years, excepting that the members of the board first appointed shall hold their offices as follows: Three for two, and two for four years, respectively, and until their successors are duly appointed. In case of a vacancy occurring in said board, such vacancy shall be filled by appointment by the Governor.

SEC. 4. Said board shall keep a record, in which shall be registered the names and residence, or place of business, of all persons authorized under this act to practice dentistry or dental surgery in this State. It shall elect one of its members president, and one secretary thereof, and it shall meet at least once in each year, and as much oftener and at such times and places as it may deem necessary. A majority of the members of said board shall constitute a quorum, and the proceedings thereof shall be at all times open for public inspection.

SEC. 5. Every person engaged in the practice of dentistry or dental surgery within this State at the time of the passage of this act shall, within three months thereafter, cause his or her name and residence and place of business to be registered with said board of examiners; upon which said board shall issue to such person a certificate duly signed by a majority of the members of said board, and which certificate shall entitle the person to whom it is issued to all the rights and privileges set forth in Section 1 of this act.

SEC. 6. To Provide for the proper and effective enforcement of this act, said board of examiners shall be entitled to the following fees, to wit: For each certificate issued to persons in practice in this State at the time of the passage of this act, the sum of one dollar. For each certificate issued to persons not engaged in the practice of dentistry in this State at the time of the passage of this act, the sum of five dollars.

SEC. 7. That members of said board shall each receive the compensation of two dollars and a half per day for each day actually engaged in the duties of their office, which, together with all other legitimate expenses incurred in the performance of such duties, shall be paid from fees received by the board under the provisions of this act; and no part of the expenses of said board shall at any time be paid out of the State treasury. All moneys in excess of said per diem allowance, and other expenses, shall be held by the secretary of said board as a special fund for meeting the expenses of said board, he giving such bond as the board shall from time to time direct; and such board shall make an annual report of its proceedings to the Governor, by the fifteenth day of December of each year, together with an account of all moneys received and disbursed by them in pursuance of this act.

SEC. 8. Any person who shall violate this act by practicing or attempting to practice dentistry within the State, without first complying with the provisions



of this act, shall be deemed guilty of a misdemeanor, and upon conviction thereof shall be fined in any sum not less than ten dollars nor more than one hundred dollars, said fines to be applied to the school fund of the district in which the offense is committed.

SEC. 9. This act shall take effect and be in force from and after its passage.

The Board of Dental Examiners, as appointed by the Governor, is composed as follows: Drs. L. Augspath and M. C. Marshall, of Little Rock; H. C. Howard, of Hot Springs; N. N. Hayes, of Helena, and L. G. Roberts, of Eureka Springs. The board met at Little Rock, May 23, and organized by electing L. Augspath, A.M., D.D.S., president, and M. C. Marshall, D.D.S., secretary.

### INDIANA DENTAL LAW.

THE Legislature of Indiana has recently passed a new act for the regulation of dentistry in that State. The new law, the text of which will be found below, went into effect the last Tuesday (28th) of June. Within thirty days thereafter every dentist in the State must register with the State Board of Examiners created by the act:

#### *An Act to Regulate the Practice of Dentistry in the State of Indiana:*

SECTION 1. Be it enacted by the General Assembly of the State of Indiana, that it shall be unlawful for anyone to practice dentistry in the State of Indiana at any time after thirty days from the appointment of the board of examiners provided for in section two hereof, without being registered according to the provisions of this act.

SEC. 2. A board of examiners, consisting of five reputable practicing dentists, shall be appointed on the last Tuesday of June, 1887, and biennially thereafter, one by the Governor, one by the State Board of Health, and three by the Indiana State Dental Association, said board to serve for the term of two years from the date of such appointment; and it shall be the duty of said board to meet annually, at the time and place fixed for the meeting of said dental association, or oftener at the call of any three members of said board, at such time and place as may be designated in such call. When convened the said board shall examine all applications, issue registration certificates thereon, and also examine all applicants for certificates of qualification, and issue such certificates to all such applicants as shall pass a satisfactory examination.

SEC. 3. Any person who shall prove to the satisfaction of said board of examiners that he is a graduate of a dental college duly and legally incorporated, and who shall present a diploma therefrom, and shall further show that said college is of good repute, shall be entitled to a registration certificate on the payment of a fee of one dollar to said board.

SEC. 4. Any person who shall present to the said board of examiners a valid certificate of qualification, issued by the board of examiners under the provisions of any former law of this State, shall be entitled to a certificate of registration upon the payment of a fee of one dollar to said board.

SEC. 5. Any person who shall file before said board of examiners an application under oath, and sworn to by one or more freeholders, setting forth the fact that

said applicant has been engaged in the lawful practice of dentistry in this State continuously since the 29th day of May, 1879, shall be entitled to a registration certificate on the payment of a fee of one dollar to said board.

SEC. 6. Any person who shall desire to obtain a certificate of qualification to practice dentistry in the State, and who shall not be entitled to a registration certificate under any of the provisions of the preceding sections of the act, shall be by said board examined in anatomy, physiology, pathology, therapeutics, chemistry, and the theory and practice of surgical and mechanical dentistry, upon the payment of a fee of five dollars to said board, and should such examination of said applicant prove satisfactory to said board, it shall issue to said applicant a certificate of qualification and registration.

SEC. 7. Any member of the said board of examiners may grant a permit to practice dentistry to any person who shall file with said member his application therefor, but such permit shall only be valid until the next meeting of said board.

SEC. 8. All certificates (except permits) issued under this act shall be signed by at least three members of said board of examiners, and said certificate shall have the seal of the "Indiana State Dental Association" affixed thereto. A majority of said board shall constitute a quorum to transact business.

SEC. 9. All persons receiving certificates of registration from said board of examiners, or permits from any member thereof, before beginning to practice dentistry, shall present said certificate of registration or permit to the recorder of the county wherein said applicant desires to practice, and the said recorder shall record said certificate or permit in the miscellaneous record of his office, and said recorder shall endorse the recording of the same on the applicant's certificate or permit, and for his service he shall collect from each applicant the sum of twenty-five cents.

SEC. 10. Any person who shall violate any of the provisions of this act shall, upon conviction thereof, be fined not less than twenty nor more than one hundred dollars for each offense; provided, that nothing in this act shall be construed to prevent any lawfully registered surgeon or physician from extracting teeth, or performing any surgical operation in the line of his professional duties.

SEC. 11. The board shall receive out of the fund created by this act such compensation for their services as the by-laws of said State Dental Association may provide.

SEC. 12. An act entitled "An act to regulate the practice of dentistry," approved March 29, 1879, and printed in the Revised Statutes of 1881 as chapter 47, and being sections 4249 to 4257 inclusive, be and the same is hereby repealed, together with all laws in conflict with this act; *provided, however*, that all violation of the law hereby repealed may be prosecuted under the provisions of the laws in force at the time when such offense was committed.

### NEBRASKA DENTAL LAW.

FOLLOWING is the text of "an act to regulate the practice of dentistry and punish violation thereof" in the State of Nebraska, which was approved and became a law March 23, 1887:

*Be it enacted by the Legislature of the State of Nebraska:*

SECTION 1. It shall be unlawful for any persons to practice dentistry or dental surgery in the State of Nebraska without first having received a diploma from a

reputable dental college or University duly incorporated or established under the laws of some one of the United States or some foreign government; provided, that nothing in section one of this article shall apply to any bona fide practitioner of dentistry or dental surgery in this State at the time of the passage of this act; and provided, that nothing in this act shall be so construed as to prevent physicians or surgeons from extracting teeth.

SEC. 2. Every person who shall hereafter engage in the practice of dentistry or dental surgery in this State shall file a copy of his or her diploma with the county clerk of the county in which he or she resides, which copy shall be sworn to by the party filing the same, and the clerk shall give certificate of such fact, with the seal of the county attached thereto, to such party filing the copy of his or her diploma, and shall file and register the name of the person, the date of the filing, and the nature of the instrument in a book to be kept by him for that purpose, and as a compensation for his services the said clerk for filing and registering the same shall receive a fee of one dollar, to be paid by the person filing the diploma.

SEC. 3. Every bona fide practitioner of dentistry or dental surgery residing in this State at the time of the passage of this act, and desiring to continue the same, shall within ninety days after the passage of this act file an affidavit of said facts as to the length of time he or she has practiced in this State with the county clerk of the county in which he or she resides, and the said clerk shall register the name of and give a certificate to the party filing the affidavit, in like manner and of like effect as hereinbefore provided, and for such service shall receive a fee of one dollar, to be paid by the party filing the affidavit.

SEC. 4. All certificates issued under the provisions of this act shall be prima facie evidence of the right of the holder to practice under this act.

SEC. 5. Every person violating the provisions of this act shall upon conviction thereof be deemed guilty of misdemeanor, and be punished by a fine of not less than fifty dollars, nor more than two hundred dollars, for each and every offense, or be imprisoned in the county jail for sixty days, or both fine and imprisonment, at the discretion of the court, and all fines collected shall belong to and be paid into the common school funds of the county where the offense was committed.

SEC. 6. Any person who shall have filed his or her affidavit or diploma, as required in sections two and three of this act, in one county and remove to another county, shall, before entering upon the practice of his or her profession in such last-named county, procure a certified copy of the record of his or her former registry, and cause such transcript to be filed and recorded in the dental register of such county in which he or she has removed.

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### OREGON DENTAL LAW.

FOLLOWING is the text of "an act to regulate the practice of dentistry in the State of Oregon, and providing penalties for the violation of the same." The act was approved February 23, 1887:

*Be it enacted by the Legislative Assembly of the State of Oregon:*

SECTION 1. That it shall be unlawful for any person to practice, or attempt to practice, dentistry or dental surgery in the State of Oregon without having first received a diploma from the faculty of some reputable dental college, school, or



university department duly authorized by the laws of this State or some other of the United States, or by the laws of some foreign government, and in which college, school, or university department there was at the time of the issuance of such diploma annually delivered a full course of lectures and instructions in dentistry or dental surgery, or who shall have passed a satisfactory examination before a competent board of dental examiners, as contemplated and provided for in this act; *provided*, that nothing in this act shall apply to any person engaged in the practice of dentistry or dental surgery in this State at the time of the passage of this act, except as hereinafter provided; and *provided further*, that nothing in this act shall be so construed as to prevent physicians from extracting teeth.

SEC. 2. A board of examiners consisting of four practicing dentists of acknowledged ability as such, and who are residents of this State, is hereby created, who shall have authority to issue certificates to persons in the practice of dentistry or dental surgery in the State of Oregon at the time of the passage of this act, and to decide upon the validity of such diplomas as may be subsequently presented for registration, and also to pass upon the qualifications of such persons who do not hold diplomas, but who may hereafter desire to enter into the practice of dentistry in this State as hereinafter provided.

SEC. 3. That the members of said board shall be appointed by the Governor, and shall serve for a term of four years, excepting that the members of the board first appointed shall hold their offices as follows: Two for two years and two for four years respectively, and until their successors are duly appointed. In case of any vacancy occurring in said board, such vacancy shall be filled by appointment by the Governor.

SEC. 4. Said board shall keep a record in which shall be registered the names and residences and places of business of all person[s] authorized under this act to practice dentistry or dental surgery in this State. It shall elect one of its members president and one secretary thereof, and it shall meet at least once in each year, and as much oftener and at such times and places as it may deem necessary. A majority of the members of said board shall constitute a quorum, and the proceedings thereof shall, at all reasonable times, be open for public inspection.

SEC. 5. Every person, whether holding a dental diploma or not, engaged in the practice of dentistry or dental surgery within this State at the time of the passage of this act shall, within six months thereafter, cause his or her name and residence and place of business to be registered with said board of examiners, upon which said board shall issue to such person a certificate duly signed by the members of said board, setting forth the facts, which certificate shall entitle the person to whom it is issued to all the rights and privileges as set forth in Section 1 of this act; and every such person who shall so register with said board as a practitioner of dentistry may continue to practice the same as such without incurring any of the liabilities or penalties provided in this act, except as hereinafter provided in Section 8 of this act.

SEC. 6. Hereafter, whenever any person may desire to enter into the practice of dentistry in this State, such person shall appear before said board of examiners at any of its regular or special meetings to be examined with reference to his or her knowledge of chemistry, physiology, the anatomy of the head and face, dental pathology, and skill in surgical and mechanical dentistry; and when the examination shall prove satisfactory the board of examiners shall issue to such person a certificate to that effect in accordance with the provisions of this act; *provided*,

that when an applicant desiring to enter into the practice of dentistry shall present a diploma from any reputable dental college, as set forth in Section 1 of this act, then upon the holder furnishing satisfactory evidence of his or her right to the same, it shall be deemed sufficient evidence of his or her knowledge and skill to practice dentistry or dental surgery in this State, and the board shall issue a certificate to that effect.

SEC. 7. The statement of every person making application to the board of examiners for a certificate granting the right to practice dentistry or dental surgery in this State, as provided in this act, shall be verified under oath before a notary public or justice of the peace in such manner as may be prescribed by the board of examiners. All certificates issued by said board shall be signed by the board, and such certificates shall be *prima facie* evidence of the right of the holder to practice dentistry in the State of Oregon.

SEC. 8. Any person who shall receive a certificate from the board of examiners, in accordance with the provisions of this act, shall within one month thereafter cause the same to be registered with the county clerk of the county in which said person shall reside or engage in the practice of dentistry, and the county clerk shall charge for registering such certificates a fee of one dollar; and failure or neglect on the part of such person to so register as provided in this section shall work a suspension of said certificate, and it shall be unlawful for said person to practice dentistry or dental surgery in this State during such suspension and until after proper application to and restoration by the board of examiners of said certificate so suspended, and upon the payment of such fee as is provided for in Section 9 of this act; and it is hereby further provided that each certificate issued by said board shall be posted up and open at all times to public inspection in the owner's office or place of business.

SEC. 9. In order to provide the means for carrying out and maintaining the provisions of this act, said board of examiners shall charge all such persons applying to or appearing before them for the purposes as set forth in this act, the following fees, viz: For examination of any such person who may be or who may claim to be engaged in the practice of dentistry in this State at the time of the passage of this act, two dollars and fifty cents; for the examination of any person holding a diploma as set forth and provided for in this act, but who was not at the time of its passage engaged in the practice of dentistry in this State, five dollars; for the examination as to qualification, as set forth and provided for in this act, of any person not holding a diploma, but who may hereafter desire to practice dentistry in this State, twenty-five dollars; for restoring each suspended certificate as provided for in Section 8 of this act, twenty-five dollars; and for each certificate issued by said board to any of the persons named, one dollar additional; and out of the funds coming into the possession of said board from fees so charged, under the provisions of this act, all legitimate and necessary traveling expenses incurred by the members of said board, in attending the meetings thereof and transacting the necessary business appertaining thereto, shall be paid, and the secretary of said board shall become the custodian of all moneys received as above provided, he giving such bonds as the board shall from time to time direct; and said board shall make an annual report to the Governor, by the first day in December of each year, of its proceedings, together with an account of all moneys received and disbursed by them pursuant to this act; *provided*, that no part of the expenses of said board shall ever be paid out of the State treasury.

SEC. 10. Any person who shall, in violation of this act, practice dentistry in the State of Oregon shall be liable to prosecution in the circuit court, and it is hereby made the duty of the prosecuting attorney for the district in which said offense is committed to prosecute such offender, and on conviction of such person so offending he or she shall be fined not less than fifty nor more than two hundred dollars, or confined in the county jail six months, for each and every offense; *provided*, that any person so convicted shall not be entitled to any fee for services rendered; and if a fee shall have been paid, the patient, or his or her heirs, may recover the same as debts of like amount are now recoverable by law; and all fines collected under the provisions of this act shall inure to the common school fund.

The Governor has appointed the following-named dentists to constitute the Board of Examiners: James R. Cardwell and John Welsh, for four years; N. R. Cox, D.D.S., and S. J. Barber, D.D.S., for two years. They are all practicing in Portland.

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## BIBLIOGRAPHICAL.

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EXAMINATION CHART. By LOUIS OTTOFY, D.D.S., Chicago, Ill.

The sheet is eleven by eighteen inches, and the teeth symbols are arranged in groups so that each indication is recorded in a series of symbols that show at a glance all the details pertaining to that class of indications; thus providing for ready reference, and quick compilation in the study of a given class. The class designations are decay; fillings; unsalvageable teeth; extracted teeth; temporary teeth shed; permanent teeth not erupted; inflamed gums; grooves and pits in enamel; stains on enamel; and for preliminary data the nativity, occupation, color of hair, features, occlusion, condition of general health, saliva tests, color of caries, color of calculus, color of teeth, density of dentine, density of enamel, history, supernumeraries, peculiarities, etc.

Dr. Ottogy has evidently in view the collection of statistics that will ultimately prove valuable,—especially so because the record will enable one to focus all the facts upon the subject under consideration with the least possible delay. The effort is all the more commendable for the reason that it involves daily, patient, careful, painstaking examinations, records extending over a period of years, and the subsequent labor of compilation and analysis for the purpose of such generalizations as will be of great practical value to the dental profession. If now a few of its members could be induced to coöperate with Dr. Ottogy, the aggregated facts resulting would do more for the promotion of real dental science than an indefinitely prolonged continuance of the supposititiously empirical methods now in vogue.



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No. 8.

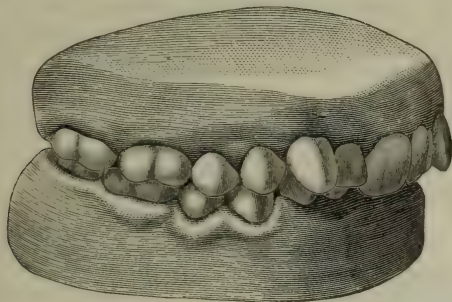
ORIGINAL COMMUNICATIONS.

MODIFIED OCCLUSION.

BY W. H. BARRETT, D.D.S., PARIS, FRANCE.

At a meeting of the New York Odontological Society, reported in the May number of the DENTAL COSMOS, Dr. Bogue presented models of a case regulated by Dr. Colignon, of Paris, for a young girl thirteen years of age.

FIG. 1.

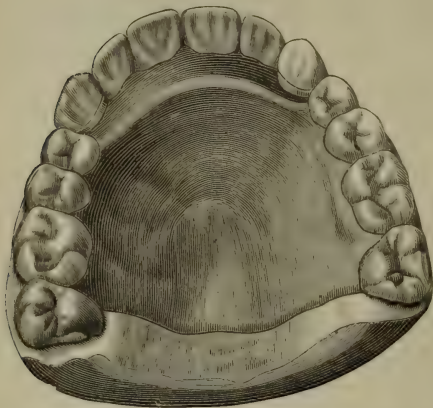


Some four years ago I corrected a case similar in some respects, for a young girl fourteen years of age. Instead of there being a pointed arch, however, as in Dr. Colignon's case, the superior cuspids were very prominent and the incisors inclining inward. When the mouth was closed the superior incisors so far overlapped the inferior teeth as to strike on the gum of the lower incisors, which likewise touched the gum behind the upper teeth. The cuspids and bicuspids articulated one tooth farther back than in the normal position, as is shown in Fig. 1.

In regard to the "jumping of the bite," it seems to me that no correct theory was advanced as to such a change in the occlusion, and by describing the method pursued in the case of Mlle. A. I think I shall be able to show this.

The first thing decided upon was to move forward the superior incisors and draw in the cuspids to nearly the position they were to occupy when the case should be finished. The fixture used for this purpose was a simple vulcanite plate, with ligatures and rubber rings for moving the teeth.

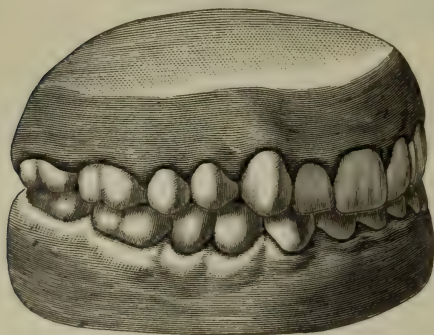
FIG. 2.



When the mouth was closed the upper cuspids and incisors then stood a quarter of an inch or more forward of the lower incisors, the lower cuspids and bicuspid articulating back of the corresponding upper teeth; the inferior incisors still touching the superior gum.

The problem now was how to move the lower front teeth forward, and so change the relations of the jaws as to prevent the front teeth from striking the gum behind the upper incisors, and get a correct articulation, which could only be done by "jumping the bite." After some study of the case I thought it could be done by producing temporarily an artificial impingement of the lower front teeth that would prevent an occlusion of the other teeth. The jaw would thus be unsupported between the condyles and symphysis, and therefore the powerful action of the masseter muscles in closing the jaw

FIG. 3.



should cause the youthful bone to yield at the angles and so protrude or carry forward the lower denture that an improved occlusion would be effected. The result answered my expectations.

In my opinion this was what took place in the case of Dr. Colignon. The force that was brought to bear on the front teeth changed the shape of the lower jaw, causing the teeth to advance, and when they were carried nearly forward to their normal position they slid over the upper teeth, and the bite was jumped without his being aware of it.

The change was made gradually in the case of Mlle. A., and not in a day or two, as it should have done to accord with Dr. Bogue's theory in the case he speaks of. The time required to bring about this result was some three or four months.

The appliance was very simple in construction, consisting of a vulcanite plate made for the palatal arch, with two thin gold bands attached to pass over the cuspids. On this plate a ridge was raised about a quarter of an inch high, and nearly the same in width, having somewhat the form of a crescent on the curve formed by the lower front teeth, and beveled in front sufficiently for the lower incisors and cuspids to slide over, so that the jaw would be forced forward, and at the same time the teeth be pressed into their sockets, when any pressure was made in closing the mouth; the plate being thick enough to prevent the back teeth from coming together. The two gold bands over the cuspids kept the plate from sliding backward; see plate in position, Fig. 2.

Figure 3 shows the position of the teeth when the case was finished. Compare with Fig. 1.

To my mind it is not at all reasonable to suppose that the patient of Dr. Colignon would have changed the bite inside of thirty-six hours. I think I have given the correct theory, as shown by the result of the treatment in Mlle. A.'s case.

## APPLIANCES FOR REGULATING TEETH.

BY W. STORER HOW, D.D.S., PHILADELPHIA, PA.

THE dentist frequently requires some simple and convenient appliances for securely attaching to one or more teeth a fixture for regulating, or for other purposes, and the devices herein illustrated and described are designed to supply ready-made means for such ends.

FIG. 1.

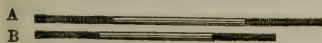


FIG. 2.



FIG. 3.



FIG. 4.



The fundamental feature of the principal contrivance is a piece of thin platinum wire .030 in diameter, an inch and a half long, and threaded to the distance of four-tenths (.4) of an inch from each end. See A, Fig. 1. This is bent in the form of a double curved bow, Fig. 2, the arms of which are separated to the width of an average sized molar at its neck. A gold coupling plate, Fig. 3, is so constructed that the bow-ends will pass through it and receive the nuts, C,



All these parts are shown assembled in Fig. 4 to constitute a molar yoke. A shorter piece of wire, B, Fig. 1, is also bent to form a bicuspid bow, Fig. 5, and a suitable coupling-plate, Fig. 6, is in like manner associated with this bow to form a bicuspid yoke, which is furthermore capable of adjustment on any of the oral teeth. The molar yoke is shown in position on an inferior left first molar, Fig. 7, and this result is easily accomplished by first pushing the threaded ends of the molar bow from the lingual side close to the gum between the molars, and between the molar and bicuspid, until the bow-ends project considerably from the buccal side of the molar. The coupling-

FIG. 5.

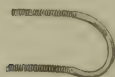


FIG. 6.



FIG. 7.

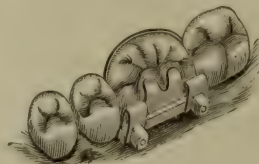
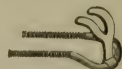


plate is then put over the bow-ends and the nuts turned on by means of the lever nut wrench, Fig. 8, in the hollow end of which a nut is first put and held by friction while being carried to and started on one of the bow-ends. In some positions it may be necessary to place the nut in the wrench-end of the lever in order to start the nut on the bow. The manner of attaching the bicuspid yoke is in all respects similar to that of the molar yoke, and, by means of the clips observable on the coupling-plates, a limit is set to the tendency of the plates under the clamping action of the nuts to impinge upon the gingival margins. These clips are easily bent with pliers to adjust the limit on varying lengths of teeth-

FIG. 8.



FIG. 9.



crowns, so that in no instance need there be any encroachment of the wire upon the pericementum or the festoons of the gums,—for, in the event of an unusually close approximation of the teeth, the wire may be made thinner with a file *fine* enough not to leave a rough bur on the cut-away threads of the opposite sides of the filed wire. In some instances it may be best to have the two sides incline towards each other, so that a cross section of the threaded portions of the wire would exhibit a rounded V shape which, with the base of the V placed next the gum, would permit the passage of the wire without any interference with the gums. In fact, the chief excellence

of this contrivance consists in the facility it affords for immediately and firmly fixing a yoke upon any tooth, of any shape, and in almost any position in the mouth. If the inner surface of a tooth at its cervix shall slope so that the bow will tend too strongly towards the gum, then a limiting clip of gold plate may be soldered to the wire as in Fig. 9. This piece will also serve for the attachment of a ligature for moving that tooth, or others. For such moving purposes, however, it is better to solder on the wire a button, Fig. 10, on which the ligature may be tied, or over which a rubber band may be caught, or from which these may easily be detached without disturbance of the yoke. The yokes are preferably so formed that the ends of a regulating bow-spring—like that of Dr. Patrick—will slide within them, and be clamped therein by the action of the nuts, which at the same time draw the yokes tight on the teeth. Thus

FIG. 10.



FIG. 12.

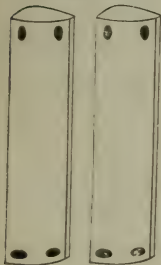


FIG. 11.

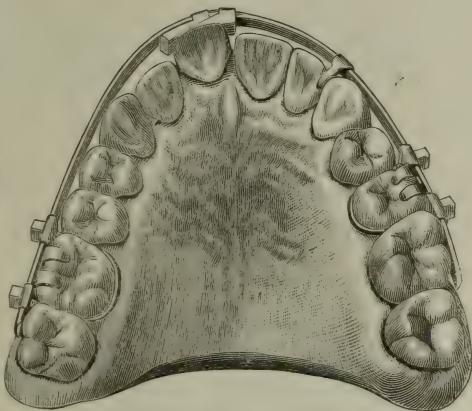
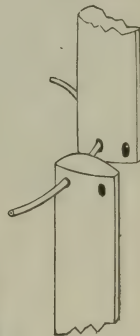


FIG. 13.



the bow-spring may be quickly inserted, adjusted, and fixed in any desired position. Fig. 11 shows one anchored to a molar and a bicuspid.

In the adjustment of these bow-springs, it is often necessary to bend them, and in order that this may be done without marring or kinking them so that slides will not pass to their proper positions on the spring, two pieces of bone are suitably shaped and perforated, Fig. 12, in such a manner that any required curvature in any direction can be given to the spring without injury to its smooth surface. It is to be observed that the holes in one end of the spring-bender are for bending the spring edgewise, and in the other end for bending it flatwise, so that by the simultaneous use of both benders, Fig. 13, double curves, such as are extremely difficult to impart by ordinary means, may by these benders be given to the spring. The

prism-like shape of the bender admits of a longer or shorter curvature according as the spring is passed through the thick or the thin part of the bender, and in the event of the unintentional formation of a curve too short to allow of the withdrawal of the spring from the bender, it is thus made evident that the curve is too short for the passage of the regulating slides, and must be so far corrected as to permit the spring to be easily withdrawn from the bender. In the Patrick system the wedges, bars, catches, hooks, and slides are fitted so nicely to the bow-spring that for their proper placing and adjustment, and for repeated application of the same bow-spring, these benders are well-nigh a necessity.

These examples serve to outline the uses of the appliances, which it is hoped will meet with general acceptance.

It may be well to add that the screw wire for the bows is of the same diameter (.030 of an inch) and pitch of thread (100 to the inch) as the anchor screws, Nos. 1 and 2, previously introduced for filling purposes. For some of the exigencies which are of frequent occurrence in regulating practice, the screw wire may, in conjunction with the anchor drill, No. 4, and anchor tap, No. 5, be found useful in the construction of such special fixtures as the ingenious dentist may devise.

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## IMPROVED DIE-PLATE AND HUBS FOR SHAPING METAL CAP-CROWNS.

BY E. T. STARR, PHILADELPHIA, PA.

IN the construction of metal cap-crowns to cover natural teeth or teeth-roots there are many methods which result in good work, but in most cases the caps do not articulate as well as they might, for the reason that means for embossing the bicuspid and molar cusps are not at hand, or available within the short time at the disposal of either the patient or the dentist. With the object of providing an easy and quick way of working under such circumstances, I have made a single plate, Fig. 1, in which are four groups of intaglio dies representing with distinctive correctness the peculiar cusps of the upper and lower right and left bicuspids and molars. These are indicated by the Hillischer notation, so that each form may be easily identified in practice.

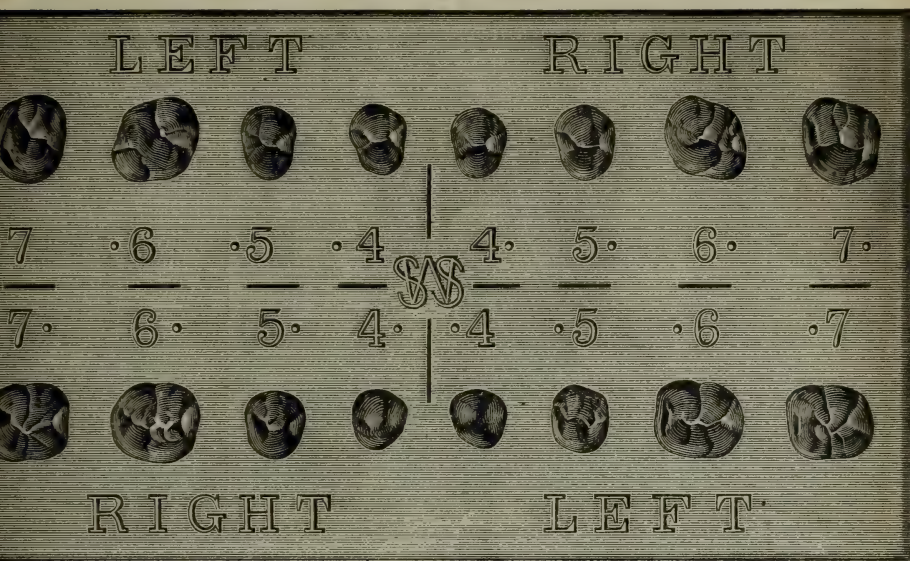
The hubs A B, Fig. 2, are of the sizes shown, and are made of an alloy composed of tin one part, lead four parts, melted together. The mold C should be warmed, the melted alloy poured in every hole, and the overflow wiped off just before the metal stiffens. This will make the butts of the hubs smooth and flat. After a minute or two the mold may be reversed, the hubs shaken out, and the casting



process continued until a considerable number of hubs shall have been cast.

In Fig. 3 a molar hub is shown in place on a piece of No. 32 gold

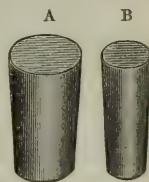
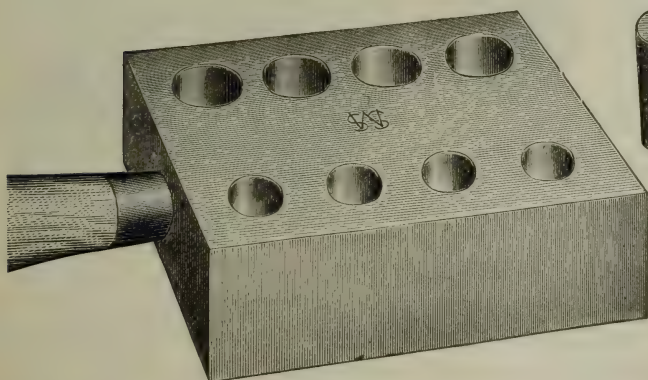
FIG. 1.



plate, which lies over the 6 (upper right first molar) die. A succession of blows on the hub, with a four-pound smooth-faced hammer,

FIG. 2.

C

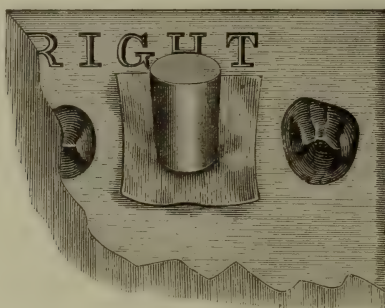


will drive the plate into the die, and at the same time spread the hub metal from the die center to its circumference in such a manner that the plate will be perfectly struck-up with the least possible risk

of being cracked. The flattened hub is seen in Fig. 4, which also shows at D the obverse of the struck-up hub, and at E the cameo of the struck-up plate having every cusp and depression of 6 sharply defined.

The counter-die plate, Fig. 1, is made of a very hard cast metal, which will admit of the striking up of many crown-plates by the

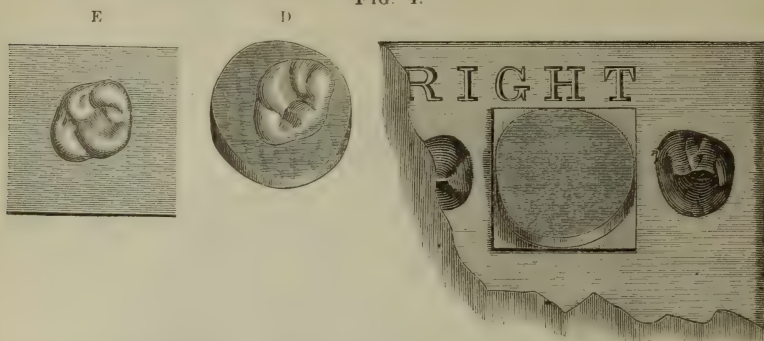
FIG. 3.



means and methods described, if the crown-plates be not too thick and stiff. Of course they should be annealed before they are placed over the die. In careful hands, the die-plate should give clear cusp definitions after years of use.

For the reason that the counter-die plate is in some respects

FIG. 4.

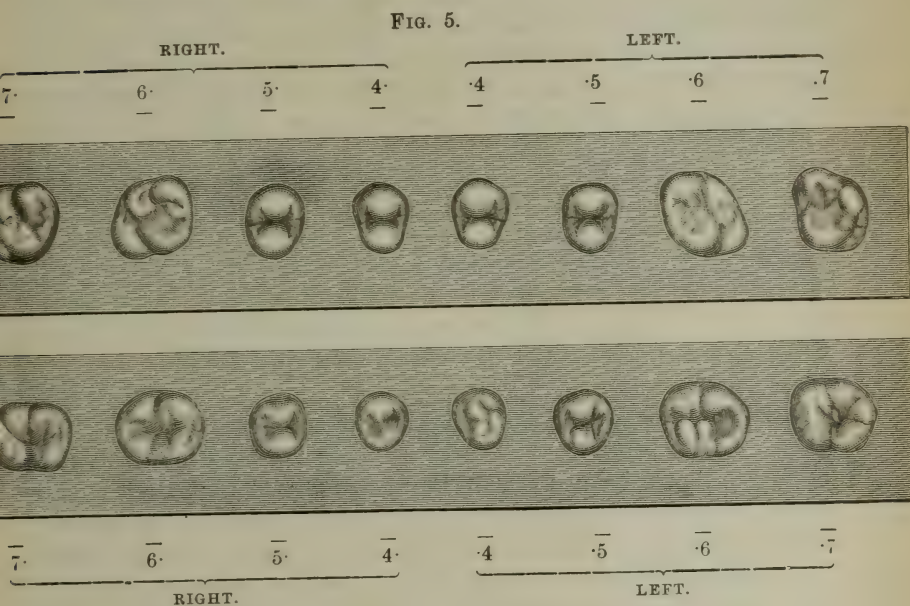


similar to a stereotype plate for printing, the struck impressions on two strips of thin plate will appear as in Fig. 5, wherein their regular order is noticeable as seen from the cameo surface of the struck plates. The peculiar action of the hub in forming first the center of the crown plate, and spreading from the center outwards, as the hub is shortened under the hammer, until the die is overspread by the plate and hub, with the result shown in Fig. 4, is an essential

feature of this process for obtaining easily and quickly the superior styles of coronal cameos shown. If a cusp or fissure should chance to crack in hubbing, a small piece of plate may be struck over it, or another crown plate be struck over the first and the two soldered together.

The depressions in the struck plate can be partly or wholly filled with scraps of plate or solder, and the surplus plate cut away from the cameo.

The fact is noteworthy that, by means of the Knapp blowpipe, the coronal intaglio may even be filled with melted scraps cut from



the identical plate out of which the cameo was struck. The better way, however, is to fill, say a twenty-carat cameo with eighteen-carat plate scraps. The fitting and soldering of the doubled or filled cameos to suitable collars is a simple matter, and need not be described.

It only remains to add the statement that, by this counter-die and hub process, gold, platinum, silver, or other metallic cap-crowns having finely-formed and solid cusps for proper occlusion and resistance to wear, can be made with little trouble and in a very short time.



## ON THE USE OF THE MATRIX.

BY THEODORE F. CHUPEIN, D.D.S., PHILADELPHIA, PA.

WHILE I concede the assistance which the matrix affords to the operator in the filling of difficult cavities, the obstacles to a clear view of the cervical margin, and the close approximation of the matrix to this margin, have deterred me from making such use of them, especially for gold fillings, as their assistance would suggest.

It has occurred to me that the difficulty with most matrices put upon the market lies in their width, and that their efficacy may be increased and the drawbacks which we have alluded to overcome in making them narrower. The Miller matrix and the Brophy matrices are easiest of application, and for this reason they are favorites; but the same difficulties lie in both. To make my meaning clearer I have sketched below two molar teeth, both with matrices applied. One (Fig. 1) is the ordinary width of the Brophy

FIG. 1.

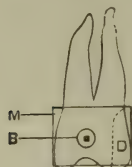
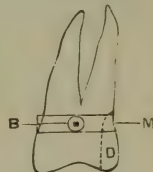


FIG. 2.



matrix, M representing in each cut the matrix, B the bolt, and D the decay. In Fig. 2 a narrow matrix of the Brophy style is applied. It will be seen that in Fig. 1 the edge of the matrix stands away from the cervical wall of the decay, while in the narrow matrix of Fig. 2 it lies close to this wall. However tightly the bolt is screwed, this will not cause the wide matrix to lie any closer to the tooth, for the pressure will be at the most prominent parts. We throw out this as a suggestion.

The advantages likewise gained in a narrow matrix are that the parts can be clearly seen and well filled at that most vulnerable part, the cervical margin. When this part is filled the narrow matrix may be unbolted and removed and then replaced with the matrix of the ordinary width for the purposes of contour.

Of the other band matrices, Dr. Guilford's has the advantage that when the work is finished and the clamp unbolted the band may be slipped off with ease between the adjoining tooth and the filling just inserted. This cannot be said either of the Brophy or Miller matrices, especially when amalgam has been used to fill the tooth, unless that filling material be very quick-setting. But the same difficulty of lying close to the cervical margin is observed with Guil-

ford's bands as with the others, unless they are made very narrow. Another difficulty, too, with the Guilford clamp is that it is extremely difficult to insert the small pin as well as the screw bolt of the clamp in the holes of the band. The Ladmore-Brunton device, for the same object as the device of Dr. Guilford,—i. e., for clamping band matrices to teeth,—offers much less difficulty in the application, and this with its flexible-handled key is a splendid arrangement. All, however, are open to the same objection, viz., the width of the band; but this may be rectified, I think, by the use of a narrow band.

While on this subject, and as pertinent to it, I will mention a suggestion made by Dr. E. R. Pettit at a meeting of the Pennsylvania Association of Dental Surgeons. He remarked that in punching the holes in the bands (he made a band for each case) he did not punch them in the middle of the ends of the bands, but on the lower edges, the two methods being shown in the cuts:



The advantage he claimed in this was, that the pressure was exerted at this lower edge, and caused the band to *flare*, so that the lower edge could be made to approximate to the cervical wall, while the upper edge assisted in forming the contour.

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## PROCEEDINGS OF DENTAL SOCIETIES.

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### NEW YORK ODONTOLOGICAL SOCIETY.

THE New York Odontological Society held its regular monthly meeting, on Tuesday evening, May 10, 1887, in the Hall of the New York Academy of Medicine, No. 12 West Thirty-first street.

The president, Dr. E. A. Bogue, in the chair.

#### INCIDENTS OF OFFICE PRACTICE.

The President. I suppose that under the head of "Incidents of Office Practice" would naturally come the discussion of the casts which have been sent by various gentlemen in response to the call which was issued by the society requesting casts illustrating good results following the extraction of the sixth-year molars. We have here one cast from Dr. Taylor, of Hartford; one from Dr. Brackett, of Newport; one from Dr. Straw, of Newburgh, and one from Dr. Clapp, of Boston. If it meets with your views, I will pass these casts around, as they are germane to our subject this evening, Dr. Davenport's paper especially. While the casts are being passed I will request the secretary to read the paper of the evening from Dr.

Thompson, after which we will take up the other subject of the evening, which is a continuation of Dr. Davenport's paper.

The secretary here read the following paper, by Alton Howard Thompson, D.D.S., of Topeka, Kansas, entitled

#### ON THE QUALITY OF UTILITY IN DENTAL OPERATIONS.

Gentlemen: In estimating the practical value of all works of utility, it is necessary to view them from the comparative stand-point, as between their present and future usefulness to the beneficiary; and for the analysis of their values they can best be classified into works of expediency and works of permanence or durability.

Utilitarians are disposed to measure the usefulness of a thing by its durability and permanence,—insinuating in tone, if not in assertion, that temporary value is not worth considering. This is the point at which it is necessary to discriminate closely and carefully in regard to the usefulness of dental operations; for their best value is not always to be measured by their permanence. But patients are disposed to so estimate the value of all our services,—that is, according to the durability of our operations,—when in fact this is often the least important factor; and as our patrons are largely from that great utilitarian class of money-valuing Americans, it is often difficult to convince them of the importance of the benefits to be derived from even the temporary restoration of a tooth to usefulness; the quantity and quality of the value of the service rendered is often in inverse ratio to the permanence of the operation itself. Hence, expediency is a defensible motive, for it is justifiable in numberless conditions to save a tooth even though it be for a brief career of usefulness.

But, of course, where usefulness and permanence are combined the highest type of perfect service is attained, and we are then all at one with the utilitarian, and it is to the achievement of this highest utility that all our progress has been tending in the years that are past.

The utilitarian has a higher ground,—namely, when he pleads for the quality of usefulness from a moral point, and makes it a question of ethics. It then becomes a consideration of duty to our fellow man, the obligation of conferring on him the greatest good—the exercise of, and the complete submission to, conscience in our office of benefactors, and the perpetual striving after a higher service of humanity. It is upon this high moral ground that the continued right to existence and support of our profession will be tried and judged by the last arbiters of all principles,—the popular intelligence and popular heart.



The dental profession, like all other avocations depending upon the suffrage and patronage of the people for life and sustenance, must continually demonstrate its right to that suffrage, and the necessity for its further support; but as this patronage has been given freely, we must conclude that the dental profession is a necessity to the public, and earns its right to existence. It has arisen by supplying a service which is useful and beneficial to humanity; and it would be interesting to trace the development of that usefulness from the earliest and crudest operations, through all stages, down to the perfection in skill and utility which characterizes its operations to-day, which have been developed by a popular demand for higher art and better service.

The archæology of dentistry has of late been pursued to an extent that has made it a most interesting branch of professional culture. From it we learn, by such ancient specimens of dental art as have come down to us, that its powers of durable service were very limited, if indeed such operations furnished even temporary benefit. Indeed, it is likely that these operations, such as they were, were not intended to be useful. Later on in the Middle Ages we observe that dental operations were more useful, but of only transient benefit, as witness the operations of transplantation and such filling and prosthetic replacement as they were able to perform. Then, still later on in the last century, we have an apparently limited usefulness with increased permanence in most of the services then rendered. In the process of development down to our own times there has been a gradual growth and increase both of usefulness and permanence, and in our own times the exhibition of these qualities has been phenomenally rapid, but with fluctuations in the flow, in all departments. The pioneers of American dentistry, partakers of the great natural genius in all departments of thought so characteristic of their age, accomplished excellent things, and laid well and deep the foundations of the more complete and higher utilitarianism of modern dental operations. That utilitarianism, founded upon the durable moral basis of conscientious service of humanity, a "doing as we would be done by," will lead the profession to yet higher planes of real service of, and appreciation by, the people.

But of recent years a great obstacle to the further development of utility has arisen, in its wanton sacrifice to the esthetic qualities of dental operations. In fact, it is a question if this development has not been at a stand-still for a decade, for it has but lately acquired a new impetus. This is doubtless mainly due to the complete overthrow of all theories of practice and isms of schools, and the rule of that eclecticism which has advanced the usefulness of our operations,

and established a much more natural condition of things than prevailed during the artistic filling craze of the preceding decade. These high-class operations did not fulfill the hopes of usefulness which were reposed in them. The tide of artistic enthusiasm was carried out to impracticable extremes, and from the lesson then learned we must be warned that danger lurks about the artistic and other crazes of this era. The capacity of nature cannot be overburdened with impunity, and the reaction that will set in against the highly-wrought but impracticable kinds of crown and bridge-work, re-implantation, the preservation of unfit teeth, etc., cannot but seriously damage our reputation for useful service in all departments of practice. It is most essential that all operations be kept within physiological limitations; there must be discrimination between the attainment of artistic ideals and the highest good of the patient. High art is to be commended when compatible with useful service, but not otherwise.

Of course, the high abilities of the dental profession to-day are preserving more teeth in permanent usefulness, with ever-increasing ratio to the quantity of disease, than ever before in its history; and the American public is in better health and comfort, because of better preserved teeth, as a standing honor to American dentistry. It used to be the fashion in society papers and addresses to present alarming statistics as to the frequent loss of the teeth, even of the young, and of the increasing use of artificial dentures, and to indulge in much gloomy moralizing upon this sad condition of the race. Occasionally we are all treated to some of this depressing but obsolete philosophy, in our day, based upon false conceptions as to the large proportion of young people who are wearing plates, and whose numbers are increasing so alarmingly! Such assertions are erroneous and misleading, for the majority of young Americans—the army of young men and women in this great nation to-day—have education and intelligence, and in consequence are the patrons of American dentistry. They are early taught to care for and preserve their teeth. Dentistry is no longer the luxury of the rich, but the necessity of all classes. Whatever may have been the fact in regard to the wearing of artificial dentures fifty years ago, there is no truth now in the statement that the wholesale extraction of teeth and the wearing of artificial dentures is on the increase among young people. Indeed, the facts prove just the opposite, in that this is rapidly on the decline. There are fewer dentures being made in proportion to the population than ever before. The classes for whom they were formerly made, who neglected their teeth and had no opportunity when young of obtaining good dental services for their preservation, are passing away. The rising generation take better

care of their teeth and attend to their professional treatment. This illustrates the great influence for good that is being exercised by the teachings of the dental profession, as well as the preservative utility of the services rendered. This fact must make us feel assured of deserving the high appreciation in which the profession is held by the people.

Then, consider also the army of children that is under our care and instruction, from the families of all classes, and estimate the influence of that teaching upon the teeth of the future. Surely the dental profession has reason to be justly proud, not only of its accomplishment in useful service to the people, but also of its educational influence, which will conduce so much to the good health of future generations. We have come upon an era of moral incentives to serve humanity better, and appropriately following a period of high artistic attainment. The ethical follows the esthetic in a natural sequence,—beauty first; utility afterwards.

The President. Are there any remarks to be made upon this excellent paper of Dr. Thompson's?

I owe my individual thanks, and I hope the society will also express theirs, to a gentleman whom I now see before me, a patient of one of our Detroit friends. It is a case that is somewhat peculiar, and the gentleman has kindly consented to allow an examination here with the view to diagnosis and such future discussion of it as we may see fit to make. It is a case of very extensive abrasion.

[A recess was here taken for the purpose of examining the case spoken of by the president.]

Dr. Benjamin Lord. I don't feel that I ought to say much in regard to the cause of this condition of the teeth. I have usually supposed that it was due to the too frequent use of the brush, with an unsuitable powder, and I should say that this case could very well be charged to that cause, as the gentleman says that he has brushed the teeth three times a day with powder composed of three parts chalk and one part pumice-stone. That would seem to be a sufficient cause for the condition that we now see the teeth in, and I believe that the rule is not to go behind a sufficient cause. I recall a case that I have been watching and caring for for some years, that is as bad as and in some respects worse than this. For a long time I attributed the abrasion to the friction of the brush; but when the front teeth, both upper and lower, began to waste away at their cutting edges, *more than they would from ordinary use*, the theory that excessive brushing was the cause was in a great measure upset. The patient, a gentleman, is about seventy years old,



and is apparently in perfect health. He has told me that he did not use much acid with his food, nor indulge in acid fruits but very little.

Dr. W. H. Atkinson. I suspect that the points where the wearing has occurred have been less dense than the other places that are not worn away. As to cause, I know nothing. Of antecedent and sequent I do know something. I do not believe that the brush and the sharp powder that has been administered is guilty of that destructive work. I think the teeth would have wasted away without the use of the brush. But that they have wasted so irregularly calls to my mind directly the imperfect integration of the tooth-substance where they are most wasted. The only other point that I care to speak of is in reply to the president's question of what should be done. We are again confirmed in the idea that I have often expressed on this subject, that the only safety is to cut beyond the line of loss and restore with gold.

Dr. S. G. Perry. I have a case that was worse than this, certainly, because the pulp of the lower cuspid was exposed, and that brought the man to me; the wasting as in this case, being entirely on the side that would be reached by right-hand brushing, and not on the opposite side. The teeth on one side were almost free from abrasion, and on the other side were cut into the pulps; and it seems to me that this is a sufficient explanation of it. I have to agree with Dr. Lord in that. Let me say that the Oriental tooth-paste was used for about twenty years by the gentleman I have referred to, and undoubtedly helped to bring about that abrasion. I have discovered that several other patients who have used that tooth-paste have suffered in the same way.

Dr. W. D. Tenison. I have often heard this subject discussed, and on one occasion I had the pleasure of hearing a very extensive paper read by Prof. Darby, of Philadelphia, in which he had described cases that he had watched for a number of years, and I was somewhat disappointed when he concluded with the remark, substantially, that he knew very little about the cause of abrasion. Some of the gentlemen present discussed the paper and advanced different theories about it, yet I do not know that any one of us now knows the cause of abrasion of the teeth. The treatment that has been suggested by Dr. Atkinson is exactly what I practice,—cutting out and filling.

Dr. E. H. Raymond. I have a patient in whose mouth the abrasion has affected all of the front teeth, and also the bicuspid. Four years ago I filled them thoroughly with gold, and in two years after the fillings were put in the abrasion went on by the side of the fillings. I know the patient was very careful about using the brush and about the powder he used, and I am satisfied the abrasion is due

to some kind of chemical action. I thought perhaps it might be due to the secretion from the mucous follicles. It may be the result of some constitutional trouble in certain individuals. At times the secretions of the mouth will be very acid, especially that from the mucous follicles running down in the festoons of the gum. In another case the teeth were abraded on the lingual side of all the lower teeth, in front of the bicuspid. I should suppose that the secretions from the lingual and the sub-maxillary glands would act as an antacid, but the abrasion was as deep as I have ever seen it on the buccal surfaces of teeth. This is the only case of that kind that I ever saw; it was very marked.

The President. One lady whom I sent to Dr. Bronson has caused me some anxiety, and knowing that Dr. Bronson has had a number of cases of that kind, I was in hopes he could help me. Her teeth show almost as deep marks as are seen in this case. Although I have casts of her teeth, I have not noticed any sudden change in them till during the last six months. The mouth is not an acid mouth, and she does not use the brush in such a way as to cause the wear.

Dr. Perry. Is it an alkaline mouth?

The President. I think it is. Her diet for the last two years has been an anti-fat diet. The gentleman we have seen this evening came into my hands in Paris, from a friend in Detroit, who had told him that an acidity of the mouth was present which would eventually circumnavigate those teeth, and they would break off. I declined to do anything. He came to me shortly after my return to New York, and I have again declined to do anything for the incisors. But out of curiosity I asked him to come here this evening.

Dr. Perry. You think the abrasion is due to the brush?

The President. I questioned the gentleman as to how he used the brush, and he showed me the manner in which he used it, and that manner of brushing certainly caused the brush to pass over those points that are most worn, and it did not pass elsewhere.

We will now have the pleasure of listening to a paper by Dr. Safford G. Perry, entitled

#### SOME THOUGHTS SUGGESTED BY DR. DAVENPORT'S PAPER.

Gentlemen: The question of the danger from disarticulating the surfaces of the teeth by extraction, which formed the opening portion of Dr. Davenport's paper, is one that does not interest me very greatly. It does not because I do not think that the perfect articulation of the teeth is of as much importance as the paper would seem to imply. I do not think it of as much importance as the

soundness of the teeth, and the healthfulness of the gums around them, but more particularly between them. We have all seen many patients whose teeth articulated very badly, and perhaps some whose teeth scarcely articulated at all, and who yet had good health and have led happy and useful lives, unconscious of the existence of their teeth. I know a gentleman, now nearly eighty years of age, who for a score of years has had only the lower incisors,—except an upper set which I made for him, and which he threw away,—and if I live to his age, I only hope I may be as rosy and “chipper” and happy as he has been during all that time. Of course, this case is exceptional, and perhaps should not count for much as against that class of feeble, undervitalized patients who need all the masticating surfaces the art of man can save for them.

I think Dr. Davenport has been so interested in noting the disarrangement of the articulating surfaces of the teeth, arising from extraction, that he has failed to appreciate the saving influence that has been exerted on those remaining,—at a time, too, when they are most subject to decay. I have seen so many cases where the judicious extraction of teeth at the right time has been followed by such good results, that I have to take medium ground on this part of the subject of the paper.

I am not, however, in favor of the extraction of, for instance, the sixth-year molars, if there is a fair chance of saving them. I think the habit indulged in by some operators of generally extracting them is a practice that should not be countenanced by those whose calling it is to save the teeth.

The latter portion of the paper, which considered the question of cutting or filing the approximal surfaces of the teeth, interested me very deeply. In fact, it gave me a mingled feeling of satisfaction and of regret,—satisfaction that the evils of the system of permanent separation (temporary separations I think would generally better describe them) should be so ably demonstrated, and a feeling of regret that, after all these years of earnest effort on the part of the ablest men in the profession against them, and after all the improvements that have been made in the art of filling teeth, leaving no longer an excuse for them, that such a paper should have to be written at all!

I had at times wanted to persuade myself that the question of filing and hacking on the approximal surfaces of the molars and bicuspid, at least, had been so entirely settled that, while no one entitled to speak with authority could be found to advocate the general application of the system, there was no one who felt that there was need of making a great effort to oppose it; that it carried with it its own condemnation so unmistakably that it must be slowly



dying out under that inexorable law of the survival of the fittest.

And yet it was my wish that was father to the thought, for I know as well as I know anything that there is not only need, even yet, of condemnation of that practice, but there is need of urgent appeal in favor of the opposite system, which is based on a more strict regard for the natural shapes of the teeth. I regret to say that it is my observation that many operators who favor contour fillings, and profess to make them, do not do so in the strict sense of the term. While they do not cut the teeth badly, or leave wide spaces between them, they do not take the trouble to restore them so completely that the teeth receive the same lateral support, and the gum the same complete protection, as before they were operated on. The teeth are designed by nature to support each other, to protect the gum, and to masticate the food. Filled or unfilled, they do all this if their shapes are kept. They cannot if their shapes are destroyed.

If an approximal filling is not made sufficiently full, or if, in finishing, it is cut or polished away to less than the original outline of the tooth, the adjoining teeth lose their accustomed support; stringy particles of food slip through against the gum, and an unnatural condition exists which sooner or later results disastrously.

A gold filling put on the approximal surface of one of my molars less than two years ago, by one of the most careful and accurate operators in this city—a strict contourist—failed and was reinserted last month, and for no reason but that the operator failed to exaggerate the filling sufficiently to allow for the unsupported condition of the adjoining wisdom-tooth, which tooth in mastication moved back in its socket just enough to allow stringy particles of food to crowd through against the gum. The gum soon lost its keen sensibility, and failed to report the presence of food, which, not always being removed, in due time induced the decay which compelled the removal of the filling. On the other approximal surface of the same tooth is a very large gold contour filling, put in by Dr. Varney nineteen years ago, which is as perfect to-day as when first inserted. Undoubtedly one filling was as perfect as the other, both in structure and in contour, and it is only just to the operator to say that no one could have predicted the slight movement of the wisdom-tooth and the subsequent failure. A new filling slightly exaggerated has stopped the slipping through of food, and has made the teeth safe and the gum comfortable.

If this occurred at the hands of one of our most accomplished operators, and one who is a firm believer in the strict restoration of the teeth, what may be expected at the hands of those who do not so fully believe in the need of firm lateral support, and complete

protection of the gum? Just what occurs may be seen almost daily from the hands of careful, conscientious men, whom we all respect, and whose work is thoroughly good; filling after filling well packed and well finished, and yet slightly lacking in fulness of contour and consequently of lateral support and protection to the gum. My explanation of this is that the pernicious influence of the old habit of filing is still unconsciously felt, and that these slight spaces are left when none were intended.

I am satisfied that many of the older members of the profession—those whose professional life commenced when what is now known as the Arthur system was accepted practice, are not even yet aroused to the importance of paying more attention to the strict shapes of the teeth. By strict shape of the teeth, I do not wish to be understood as advocating the absolute restoration to the complete outline of the tooth in all respects, but I do mean a restoration that shall give firm lateral support to the teeth, and complete protection to the gum. This does not by any means imply the need of building out in all cases large fillings that shall conform to the original shape of the teeth. Many teeth would not bear this, and some that would might not be sufficiently benefited to justify it. I do not want to be considered as going to extremes in this matter for the sake of contour; I only wish to be as emphatic as I can on one point—the firm point of contact!

It is my firm conviction that among the minor evils of dental practice at the present day—and I cannot believe that dental practice is as yet for our patients an unmixed good—there is none so great and none so common as this wide-spread habit of disregarding the natural shapes of the teeth. I feel entitled to the privilege of speaking boldly and strongly on this subject, for I have experienced in my own mouth, and I have practiced on my patients, everything that I have praised or condemned, or that has been praised or condemned by Dr. Davenport's paper. I can show mouths that have been under my care for over twenty years, with fillings of all sizes and in all locations, and with as perfect articulations and as perfect gums between all the filled teeth as can be found in mouths where teeth have never decayed or been filled at all. On the other hand, there has been shown by Dr. Davenport's illustrations cut and mutilated teeth which I do believe are little if any worse than some that I could show from my own prentice hand. Thanks to the influence of the late Dr. Varney, the former make a goodly number, and the latter by patient and persistent effort as the teeth need attention are being reduced in number by partial or complete restorations.

Through all that demoralizing period which followed the pub-

lication of Dr. Arthur's book—a period which I wish could be blotted out of my professional existence—it was my good fortune, although I became a convert, and practiced his system, to keep my destroying hands off the teeth of many of my patients, and to-day those patients are the ones by which I wish my professional work might alone be judged. Therefore, I venture to claim to be heard on this subject. It is not a new subject with me. At the risk of tiring you, I will read a short extract from a paper I presented before the State Society at Albany ten years ago this month. It will show you what conclusions my experience had led me to then, and will enable you to see how they are confirmed by what I have to say to-night:

Whenever full contour fillings are made, they should be so shaped as to touch firmly at the grinding surface. No compromise whatever can be allowed here. If even a slight space is left between them at this point, food will force through and lodge against the gum, and cause all the annoyance that can be expected from the worst kind of permanent separations. In view of this, I think it unnecessary, and sometimes even unwise, to fully restore teeth that, from the loss of a neighbor or a change in the occlusion, must eventually move slightly apart. I think it better to anticipate such inevitable change of position, and make at once a free self-cleansing space down to the gum. Such an open space is less annoying than one wide at the gum but narrow at the grinding ends of the teeth. I am led to think that some operators, who claim to have had unfavorable results with contour fillings, have not prepared their cavities so as to get free margins, and have not always taken nature as a guide and carried their fillings out round and full, and so shaped as to touch firmly at the grinding surface, or at any point between it and the gum. To a certain extent it is unfair to admit the testimony of such operators against contour fillings. The system of restoration is one that must be practiced thoroughly, if it is attempted at all. I suppose it is unnecessary to speak in condemnation of approximal fillings filed flat, with no attempt at securing a self-cleansing space, or a perfect contour. Such aimless operations show either carelessness or inability on the part of the operator. They are worthy to be classed among the early efforts of the dental profession.

It may be thought that I take strong ground in favor of contour fillings. As a general rule of practice to be applied in most cases, I certainly do. I am forced to this position by my own observation and experience.

Let me hastily sketch that experience, though it compels the use of the personal pronoun oftener than I wish, and betrays me into the expression of motives and feelings when I ought to be giving you scientific reasons for the conclusions I have reached. My earliest method of managing these surfaces was to cut until I reached sound structure, and then to fill even with the edge of the cavity, giving little thought to the shape of the teeth, the safety of the gum, or the danger of future decay. This was before the rubber dam. Later, under the influence of the late lamented Dr. Varney, and from observation of Dr. Atkinson's method, I became convinced of the advantages of accepting nature as a guide, and for several years, in most cases, I made strictly contour fillings. In 1870, in a paper read before the Odontographic Society of Pennsylvania, and published in the November DENTAL COSMOS of that year, I am on record in favor of such operations. Several years' experience developed no objections to them, except that they were difficult to perform, were expensive, and confined attention to a limited number of patients.



After the publication of Dr. Arthur's book, I began to question if I had not been doing unnecessary work. A careful study of this system, with such observation of its practical effects as I could obtain, led me to think favorably of it. A growing practice forced me to be ready to accept any method that fairly promised the greatest good to the greatest number. Therefore I "first endured, then embraced." I commenced timidly, but grew bolder as I became more accustomed to cutting the teeth. Finally, I became so demoralized as to willingly destroy the shapes of teeth that I had before guarded with jealous care. I made all the different kinds of separations described in this paper. I made them very carefully, and always endeavored to avoid annoyance to the gum, and whenever I could to prevent change of position of the teeth. My general rule was to reduce the surfaces in contact to a point of minimum size. The result of that practice, extending over a period of four or five years, has not fulfilled its promise. It has proven instead a source of discouragement and mortification. Failures which formerly occurred only in reasonable numbers have, under this system, been surprisingly frequent. The average of operations performed seven and eight years ago is to-day standing more securely than the average of those performed three and four years ago. Irritation of the gum and change of position of the teeth which could not occur before have frequently followed this practice, even though I have taken the greatest care in making the spaces.

There has been left me, therefore, no alternative but to return to the restoration of the shapes of the teeth as a general rule of practice. Considerations of pecuniary interest would lead me not to do this. The hope of health and long life are certainly not strengthened by it. But it has come to be so much a matter of conscience that I have no choice. I can no longer adhere to the practice of permanent separations and feel that I have rendered my patients the service they have a right to expect. Nor can I longer bear the demoralizing influence which this practice encourages and begets. During the last year I have been restoring the shapes of the teeth, and the feeling I have had suggests the return of the prodigal son. If I have any satisfaction in reviewing the labor and experience of the last five years, it is that I have learned between what teeth and under what circumstances permanent separations may be safely and advantageously made.

In reply to the general statement that restorations necessitate hard work, I can only say there can be no excellence without labor. In the very nature of things, there can be no royal road to permanent success of any kind. But I think it will weary one but little more to devote six hours each day to a few operations which are performed well, than to give six hours to a larger number which cannot be performed so well.

I would not presume to weary you by reading this extract from an old paper but for my desire to show you that my conclusions are not theoretical ones, but are the results of long study and an earnest seeking after the law that underlies these approximal operations, which are the most frequent as they are the most important of any we preform.

Ten years' additional experience since this was written finds me with no desire to change a word of it, unless to make it stronger in favor of contour filling as a general rule of practice. In fact, if I look back upon my experience in cutting and filing teeth as on a period that I could wish blotted out, I can truly say that I look

forward to such work as may be left me to do with a feeling of satisfaction in knowing that hereafter I shall be working with nature and not against her. You all know the old saying that "he who works with nature works well, and he who works against her works ill."

Under certain conditions of softness of teeth, nervousness of patient, slenderness of purse, or, to carry a patient over until time can be found for more permanent work, I am willing to risk injury to my reputation by the use of gutta-percha, oxyphosphates, and amalgam, but I am not willing to subject a patient to the evils that may follow cutting the teeth. I draw the line at that. It is a practice I have put behind me forever. It is one of those questions in practice where one with firm convictions must take one side or the other, and I choose to be counted with those who regard the shapes of the teeth, believing (as Dr. Atkinson so many times has said) that "frail teeth are not saved by permanent separations, and with good teeth they are unnecessary."

If further proof of the correctness of my position is needed, I could name for you a long list of men whose practice is that of restoration of the shapes of the teeth, and by common consent they are the most eminent men our profession has produced. Many of them have been so fortunate—perhaps I had better say so level-headed—as never to have made spaces between the teeth, and their work stands an unconscious comfort to their patients and a lasting credit to themselves. I think it is safe to say that Dr. R. W. Varney reached high-water mark in the art of filling teeth. No one who came before, and no one, to my knowledge, who came after, excelled him in saving teeth. I have seen a great deal of his work (much of it now of twenty years' standing), and I have never seen or heard of a filling of his that was not contoured. He said to me once that his ambition was, if cut short in his work at any moment, the last filling he put in should be his best—the one he would be content to be judged by.

We shall never make progress unless we keep high ideals before the mind. Who is there who will say that high ideals are followed when, with a file or chisel, a slash is made between the teeth, destroying that which nature has designed so well! When we do these things we come to our work with no reverence for that which is perfect,—with no feeling that the true artist has who, knowing his limitations, can have no higher ambition than to reproduce nature. If you say that science has nothing to do with ideals, then I answer, that our work is not strictly scientific; it is art work, for dentistry is one of the finest of the fine arts, and art work is never anything if it is not idealized. I would not have you infer from this that I would favor making a treasure-house of art of the

mouth of a patient. The dentist who makes his work to show loses sight of his true calling. There are practical considerations that outweigh all others.

It seems to me the highest point an operator can reach is to make beautiful gold fillings, and be content if they are buried under the ground and never seen and admired by any eye but his own. At the same time, I am ready to commend the man who, under certain conditions, has the courage to use inferior materials, such as oxyphosphate on grinding surfaces, gutta-percha on sheltered approximal, and amalgam for restorations of large cavities in frail back teeth. It may not be possible to do artistic work with such materials, but it is possible to preserve the shapes of the teeth, and by this means do saving work with them.

This restoration of shape will often give an advantage sufficient to more than overcome the deficiencies of the materials themselves. There can be no doubt that a well-selected amalgam—one containing a fair per cent. of copper according to Dr. Flagg—can be sometimes used in such a manner as to get as good a result as can be had by any other means.

In actual practice it may seem difficult at first sight to combine the ideal and the practical. I think it will be found true, however, that, whatever material is used, a better practical result will be secured if we keep to the ideal shape of the tooth. And if one has the artist's love of form and outline, and keeps the ideal tooth in mind, his work may be a never-ending source of pleasure. The more so because it is a real combination of the ideal and the practical, for I know of no instance in the whole range of art-work where regard for the ideal is followed by such practical results.

The President. Gentlemen, you have heard Dr. Perry's excellent addition to the discussion of the subject. We have before us one or two letters from our friends from abroad, some of whom were present at the last meeting. Perhaps it will be courteous to have the communications read before Dr. Perry's paper is discussed.

The secretary here read the following communication from Dr. L. C. Taylor, of Hartford, Conn., dated April 27, 1887:

#### DR. TAYLOR'S COMMUNICATION.

Gentlemen: On April 12 I was permitted the pleasure of being present at your meeting. The subject presented at that time is one involving perhaps more vital principles than any other pertaining to the practice of dentistry. To say the production is a credit to Dr. Davenport, showing as it does careful thought and observation,



and presenting things as they appear to him, is only a just tribute. It seems to me that in nearly every case presented extraction was resorted to for immediate relief without any conceivable idea of future consequences. In some of the cases there may have been other reasons that would be of greater importance than the mutilation of the mouth.

The writer in closing asks, "Why extract?" I should answer by saying, "Extract for *cause* only." Cause should be considered in the balance as against such mutilations as those presented, except the case be one where the teeth are much too large in proportion to the jaws; then extraction becomes a forced necessity.

It is a well-known fact that our American people are an amalgamation of many different nationalities, composing the large and the small osseous structure. We further note from careful observation that much the larger percentage of those we operate for partake of the teeth of the father and mouth of the mother. June 13, 1879, at Northampton, I am recorded as saying, "Wherever there is a mixture of blood the patient is apt to partake of the mouth of the one and the teeth of the other parent; hence we have the large and small bone mixture, and the result must be, in very many instances, a crowded state of the teeth." If the teeth of our patient indicate a man six feet high, and by the introduction of a much smaller race on the mother's side shall produce a structure only five feet seven, there will then be little question that a moderate thinning out will be of benefit, and if done systematically, at the right period of life, we will find few if any such cases as presented.

We are too apt to take extreme cases to talk about in conventions. A young man sees the good or bad results as presented, takes them as a basis of truth, and is governed by this or that theory until he sees that his mistakes are greater than the good he has done. Then he is ready to condemn the whole theory, and possibly swing to the other extreme.

In accordance with a promise made your president, I send the models of a case somewhat impaired by the extraction of the four second bicuspid, with a brief history of the same:

May 29, 1876, Miss H. called to have her mouth examined, and such work done as should seem best. A more beautiful occlusion, with the exception of the right cuspid shutting inside, could rarely be found. There were two or three little cavities in the fissures of the molars, and somewhat more decay in the two centrals; otherwise the teeth were perfect.

Drs. Riggs and S. being in the adjoining room, I invited them to look at the mouth. Dr. S. and myself were debating the advisability of attempting to change the occlusion of the cuspid, which

was decided to be doubtful, as the young lady was then in her twenty-third year. Dr. Riggs privately remarked, "Well, boys, you have done very well—just what I thought you would do; but it is very evident you have not even thought of the greatest evil that exists. I will make the assertion, without hesitation, that this young lady is afflicted with exostosis, and all I know about it is by the sluggish redness of the gums,—a color peculiar to itself, and only slightly different from what is seen when inflamed by tartar; that most dentists would pronounce it a case of the so-called Riggs's disease; but it is not tartar which is the principal cause, though some tartar is present."

We then returned to the patient, and Dr. Riggs asked her if she ever suffered any neuralgic pains streaming up through the temples. Her reply was prompt and emphatic that she did, and as often as three or four times a week would lie down and cry for hours, the pain was so intense. Dr. Riggs then asked if she had any dull, uncomfortable sensations about her teeth that would in a measure be temporarily relieved by biting them together hard. She said she had. The doctor then explained the peculiar condition of the gums as referred to before, and told us there was no doubt in his mind as to the cause of all her pain. She admitted that her physician had treated her for neuralgia for more than a year without perceivable benefit. Dr. Riggs advised the removal of the four second bicuspsids, which was done at the same sitting.

The teeth speak for themselves, as you will notice well-defined exostosis that had extended so far that the nerve was being choked off. Miss H. informs me she has never had a twinge of neuralgia since the teeth were removed, and further says she would prefer to have lost all her teeth than suffered as she did. I have been able in only two or three cases since to assure myself before extraction that a similar trouble existed. To assure one's self so that he is willing to sacrifice good teeth requires a better diagnosis than most of us are capable of making.

The following paper by Dr. J. T. Codman, of Boston, Mass., was then read:

#### DR. CODMAN'S REMARKS ON DR. DAVENPORT'S PAPER.

Gentlemen: In considering the paper of Dr. I. B. Davenport, read at the last meeting, I want to take up a point or two which he did not make, probably because it was impossible to explain himself fully upon all points.

I understood the paper to say, "Never extract the sixth-year molars until the twelfth-year molars are erupted." As I understand

this phrase, it would not convey my own idea, nor the whole of Dr. Davenport's. What I think he intended to say is, "Never extract the sixth-year molars until the twelfth-year molars are erupted and *fully in place*." Then and then only are the twelfth-year molars safe from tipping forward.

We will notice that the upper and under molars are placed normally so that when the teeth are in full position and the jaws closed the cusps of the teeth of one jaw interlock and hold the opposing teeth in the exact place where they ought to be. If there is a tendency, from the loss of the sixth-year molars or other reason, for the twelfth-year molars to tip forward, the occlusion of the teeth will keep them in their places. But there are exceptions to all rules, and this is one. If the jaw is deficient or soft in its osseous structure, there may be some displacement in spite of the occlusion.

I would therefore *add* to the rule this statement: Do not extract the sixth-year molars until the twelfth-year molars are fully erupted, in their places, and the process firmly solidified around them. If this condition is carried out, and the molar cusps firmly interlock, then any forward movement of the molars will be equally balanced in both jaws,—that is, they will both come forward together as with one impetus.

I think Dr. Davenport stated in his paper that under no consideration should any of the six front teeth be extracted to diminish the overcrowded arch. This is a rule also demanding more exceptions than at first thought. There is a mouth from which I have extracted the right superior lateral after having brought the left superior lateral forward to position. The loss is an improvement, and is not observed except on critical examination.

It would give me great pleasure to forward to the society models of mouths showing benefit and improvement following the extraction of the sixth-year molars, but my attention has been drawn more towards the practice of retaining those teeth with its attendant class of facts. I think that the attention of our profession has been drawn too much toward extracting, and viewing the subject from this direction I have not thought Dr. Davenport's paper either one-sided or overdrawn.

I am very anxious to be in the right on this important practical question, and do not desire to be considered as on either *side*. After the extraction of the sixth-year molars certain deformities of position are quite sure to follow, and as I have not seen described some of the reasons for them, I will try to explain in text what perhaps could much better be done with a black-board.

Let us draw two parallel horizontal lines at the distance of an inch apart which we call *the lines of measurement*. Between these



lines we place a diagram of the upper and under sets of teeth, and midway between, at the occluding point, we draw another horizontal line which we call the *line of occlusion*. When the sixth-year molars are in position, and before any change has taken place, the line of occlusion is where the upper and under teeth meet. Extract the sixth-year molars at too early an age, and the lines of measurement approach each other so that the teeth have to be developed in a space too small for them, and provided they had exactly the right room before, they must be crowded out of position after this extraction. The teeth then separate, the cusps of the under bicuspid work into the spaces between the upper bicuspid, and the inclined planes of the six upper teeth, struck by the fronts of the under centrals and cuspids, are forced forward, causing an irregularity which is modified only by the weakness or strength of the muscles of the under jaw, by the firmness or weakness of the osseous structure, and also by the number of the permanent teeth erupted. It is usually the upper set that is pressed forward, because the under arch is the firmest; but be that as it may, the rule is that the arch that is strongest or has the most resisting power will press the other one into the opposite position.

I have been speaking of normal development, which is, I think, the text of Dr. Davenport's paper. We have to assume that what we call a perfect set is normal. A hundred irregularities may be caused by abnormalities the basis of which is imperfect nutrition and development. A common abnormality is that form of the jaws where, the line of occlusion not being parallel to the lines of measurement, there is no occlusion except in the back teeth, and sometimes only on the sixth-year molars. So severe is this occlusion on these young and tender teeth that they often give way and break down,—the upper molars settle down into the cavities occasioned by the breaking away of the lower ones. Even then a better articulation may often be secured for the future by filling the teeth with plastic fillings and retaining them for fulcrums over which the under jaw may rock in the natural effort which will be made by every patient to bring his front teeth together.

But on this one point alone a paper could be written, and as I only intended to give a few hints, and not a dissertation, I trust you will accept what I have written as such, trusting that others may take up the subject according to their various lights, and give us from the wealth of their information.

The President. There are remarks to be made upon each one of those casts, I think, that would show that unless the extraction took place under a pressure that imperatively called for it, the extraction

was a mistake. In this case of Dr. Clapp's it will be seen that the lower incisors touched just on the posterior portion of the upper incisors. The patient being twenty-two years of age, if she lives twenty-two years more she will have worn away the back teeth considerably, and the lower incisors will strike the upper ones; the upper incisors will protrude, and there will be a greater crowding at the back, and decay on the approximal surfaces.

The cast that Dr. Brackett has sent is one of the best, and one of the best explained, that I have ever seen attending extraction of the sixth-year molars; but when the cast is cut so as to show the articulation of the lingual side of the molars and bicuspsids, the occlusion will probably seem much less favorable. [Illustrations of the cast referred to will be shown in the next number of the DENTAL COSMOS. —EDITOR N. Y. O. S.]

Dr. J. Morgan Howe. It seems to me that the cast sent by Dr. Brackett shows one of the best results that I have ever seen. There can hardly be much fault found with the condition of the mouth, as represented by the plaster cast.

Dr. J. W. Clowes. This cast from Dr. Brackett fairly represents the happy results of regulating by extracting sixth-year molars. It is a splendid illustration of dental culture, set in plaster. I am used to seeing such plants in "oral gardens" under my own management.

The President. It is to be hoped Dr. Clowes will present models of some of his cases.

Dr. Clowes. I regret my inability to properly do this. I have not the conveniences; neither am I apt at making models. I prefer to exhibit the real thing in living mouths. Let this society at some set time send a committee of inspection to my office, and see what my achievements are in this direction. Possibly the parties in possession may object to examinations, yet I think a little time and explanation would gain their consent. A sight to behold is a well cultured "garden of the mouth," and worthy the highest aspirations of earnest toilers in dental art.

The President. I will suggest to Dr. Clowes that while the society would naturally be grateful for the opportunity he proposes to give us if it could be accepted, it is not possible by looking at the mouth itself to know what the articulation is, or what the changes have been or are to be. Models only, in connection with the mouth, will show that. This model that I hold in my hand, open on the back, is the only one sent that allows us to see what the condition of things within is, or whether a proper tritulating apparatus is present.

Dr. Clowes. This case from Hartford gives me an unpleasant

surprise! Unlike the specimen from Newport, there is not a gleam of sunshine in it. It is a plant that was grown in shadow, and should have remained there! A young lady of twenty-two complained of neuralgia, and applied for relief to high professional authority. A diagnosis was made and the cause of disturbance adjudged to be periosteal inflammation from exostosis, and the late Dr. Riggs is said to have indorsed the opinion. Under this fiat, four perfect bicuspidis were extracted, and they are attached by a wire to this model for our edification and instruction! The exostosis, if any, is only dimly perceptible, but that a mistake was made in removing the wrong teeth is woefully apparent! The operation, however, was considered a success,—for neuralgia departed and the patient was grateful! The real cause of trouble was intense forward pressure by erupting wisdom-teeth. The loss of these would have brought an equal cure, and the bicuspidis remaining might have saved to the mouth a pleasing form and the expression of beauty.

Dr. Atkinson. I wish there was time to review the very interesting presentment that has been made to-night. There is material here for a two hours' conversation and direct question and answer. The last speaker says there was no exostosis. I presume he means hypercementosis, according to the present nomination. There is exostosis and hypercementosis; and there is something that has not been taken into account by the gentlemen who sent the specimen,—there is absorption. There was irritation, and the irritation went too far. If there had been sufficient discrimination before the irritation was there, if indeed it was preceded by the resistance of the developing wisdom-tooth, then and then only could the effect be brought about to arrest the downward metamorphosis of the nutrition. I feel that Dr. Riggs was almost inspired in this case; that he had a second sight when he made this diagnosis.

Dr. Clowes. Do you not think that the extraction of the wisdom-tooth would have answered the same purpose?

Dr. Atkinson. It could not have possibly restored the lost tissue that had already involved the loss of the pulps themselves. Probably the cause was constitutional entirely. This is one of the most instructive cases that I have ever seen of a persistent neuralgia that was relieved by the removal of a tooth; but we must necessarily be, as judges and jurors are, at the mercy of the witnesses. I did not see this patient, and if we can have nothing but after-thoughts respecting the case, we have not the inspiration and illumination of the presence of the patient, and that *tout ensemble* that gives us the conviction that we call diagnosis. Where is humanity manifested if it is not manifested by just such men as we see here to-night. Here is my beloved S. G. Perry, who has given us one of the best papers



he ever wrote, although he said it was incomplete. It is by our hearts that we diagnose our cases, and not by our heads. I give you that as a choice aphorism.

How came this disease there? We do not know. But we can trace it to an aberration of nutrition manifested in either molecular, corpuscular, tissual, organic, systemic, or conscious activity. We have not the patience to properly deal with these things. The curse of humanity is immediate self-interest, and we do not look into the steps that we are taken through in making our diagnoses.

There is a boy (Dr. Perry) that I am glad was born again. When he and Dr. Bogue went down there to Baltimore to see Dr. Arthur, I said they were going to pandemonium, and were likely to be scorched, and they called me crazy.

Dr. Perry. Give it to us; we deserve it.

Dr. Atkinson. I did it because I loved you. I was stirred when I saw the young gentleman in whose mouth the case of erosion is. We have to go back to the building up of these structures and try to learn how bodies are built, and how they are nourished, and how they are unbuilt; and whether it is by what is called nutrition, pathological, chemical, or mechanical action, that this tearing down is accomplished; for that is what decay means. If we would see that, and not run wild about brushing and powders, and all that, but take steps serially, and when anyone asserts that it is to their apprehension the result of brushing and powder, ask them to detail the facts of the case and then question them upon it, we would very soon find how very little we know about the matter. I have seen very many cases where the disintegration was entirely out of the reach of the brush, upon the molars, sometimes the cuspids and bicuspid, between the teeth, where the channels were cut as smoothly as I could polish them with any instrument in my possession; and the abrasion was upon surfaces that could not have been touched with a tooth-pick or anything else in the hands of the patient.

The President. Dr. Perry asks how you account for the fact that one tooth decays in the mouth and not another, that the abrasion is on one side of the mouth and not on the other side; and it was that point I had in mind when I asked the gentleman to come here this evening. Why is this difference?

Dr. Atkinson. I can only say how it impresses me. The teeth develop in pairs, and they are usually constructed so as to constitute the same degree of effort toward perfectibility, and hence we find they decay in pairs; even to the individual locality of the point of disintegration. I saw in this gentleman's mouth that there was some waste on the upper as well as on the lower teeth, on the right side,—places where the enamel was gone. There may be some in-

creased waste in consequence of this brushing; but how is it that the first bicuspid above and below on this side, which probably developed pretty nearly together and under the same systemic condition, are wasted? Those two teeth are similarly worn or wasted away; but the first bicuspid below is more wasted than the one above. If you attribute it to mechanical action, they were not the most prominent teeth and were not specially in the way of the brush. The left central showed also a condition of wear. But the most prominent part of that tooth is not worn, as you can see. It is not in line either with our ideas of the integration or the decalcification of the teeth. So I said I did not know what the cause was, and I say so still. As to treatment, I repeat, cut entirely beyond the apparent deterioration and fill.

The President. Dr. Atkinson, the tendency of Dr. Davenport's paper was in the direction of the preservation of the sixth-year molars from extraction in all cases if possible, and among the reasons given was the fact that in some instances even more than one-half of the triturating surfaces were lost by their removal. Have you examined that question?

Dr. Atkinson. I have. I have said that if one of the sixth-year molars be extracted all four should be, though if one is badly broken down, and the others are in such condition as to be made useful, it would be better to treat the roots and put on an artificial crown. If one is gone, cap the two adjoining teeth and put an artificial one on, for the sake of holding the contour line so that the occlusion shall remain firm and satisfactory.

We will not get through with Dr. Davenport's paper for five years. It is the best paper he has given us. It is a great satisfaction to me to see that the truth is prevailing to the extent that it is, and that men who are fit to be dentists are growing to such an apprehension of it. If we would conversationally come together a great deal more than we do, we would see a growth like that of Topeka Thompson, and the rest of the boys out West, who are showing that they know more of principles than they have heretofore.

Adjourned.

S. E. DAVENPORT, D.D.S., M.D.S.,  
*Editor N. Y. Odontological Society.*

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#### COLORADO STATE DENTAL SOCIETY.

THE first annual meeting of the Colorado State Dental Society was held at Denver, Colo., commencing Tuesday, June 7, 1887, the sessions continuing for two days.

The following officers were elected: Wm. Smedley, president; J. W. Grannis, first vice-president; B. W. Rogers, second vice-presi-

dent; J. N. Chipley, corresponding secretary; and H. P. Kelley, recording secretary and treasurer.

A large number of the profession were present, much interest and enthusiasm were manifested, and several instructive essays were read.

The project for the establishment of a dental college in connection with the Denver University was favorably entertained.

The next annual meeting of the society will be held at Denver, commencing on the first Tuesday of June, 1888.

H. P. KELLEY, *Recording Secretary*,  
Denver, Colorado.

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### MISSOURI STATE DENTAL ASSOCIATION.

At a meeting of the Missouri State Dental Association, held at Kansas City, Mo., June 21-24, 1887, the following officers were elected for the ensuing year: Wm. N. Morrison, president; T. M. Nicholson, first vice-president; J. F. McWilliams, second vice-president; John G. Harper, recording secretary; Wm. Conrad, corresponding secretary; James A. Price, treasurer. The next meeting will be held at Perle Springs, Warrensburg, Mo., the first Tuesday after July 4, 1888.

WM. CONRAD, *Corresponding Secretary*,  
Hotel Beers, St. Louis, Mo.

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### GEORGIA STATE DENTAL SOCIETY.

THE nineteenth annual meeting of the Georgia State Dental Society was held at Cumberland Island, Ga., May 24 to 28, 1887.

After three days of very interesting labors, the following gentlemen were elected officers for the ensuing year:

B. H. Patterson, president; S. A. White, first vice-president; J. A. Chapple, second vice-president; L. D. Carpenter, corresponding secretary; W. L. Smith, recording secretary; H. A. Lowrance, treasurer. The following constitute the Examining Board: S. B. Barfield (chairman), N. A. Williams, A. G. Bouton, Wm. C. Wardlaw, and G. W. H. Whitaker (secretary).

The society adjourned to meet the first Tuesday in August, 1888, at Dalton, Ga.

L. D. CARPENTER, *Cor. Secretary*, Atlanta, Ga.

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### NEW HAMPSHIRE DENTAL SOCIETY.

THE eleventh annual meeting of the New Hampshire Dental Society was held in Concord, N. H., June 21 and 22, 1887, and was one of the best meetings ever held by the society.

Vice-President B. C. Russell presided, and able and interesting



addresses were delivered by Prof. C. A. Brackett, of Newport, R. I., and Prof. R. R. Andrews, of Cambridge, Mass.

The following were elected officers for the ensuing year: B. C. Russell, president; C. H. Hayward, vice-president; E. B. Davis, secretary; G. A. Young, treasurer; C. P. Webster, librarian; William Jarvis, chairman of board of censors; E. G. Cummings, chairman of executive committee; E. B. Davis, secretary of the board of censors and executive committee.

The next annual meeting will be held the third Tuesday of June, 1888, at Concord. E. B. DAVIS, *Secretary*, Concord, N. H.

### CHICAGO DENTAL CLUB.

THE following resolutions were adopted by the Chicago Dental Club, June 27, 1887:

*Whereas*, At the last annual meeting of the American Medical Association, held in this city, a resolution was passed recognizing the graduates of all dental colleges which require a thorough course of instruction in all the fundamental sciences which underlie medicine and surgery, equal to the standard required by the best medical colleges of our land, as entitled to membership in that association, with all its privileges; and

*Whereas*, Our honored friends, Drs. N. S. Davis and W. W. Allport, of Chicago, were largely instrumental in bringing about this action of the association; and

*Whereas*, Both of these gentlemen have always taken an active interest in promoting higher education among dentists and were also largely instrumental in the establishment of dental chairs in the medical colleges of our city and the Section of Dental and Oral Surgery in the International Medical Congress; therefore, be it

*Resolved*, That we, the members of the Chicago Dental Club, express our appreciation of their untiring efforts and devotion to the cause of higher professional education, and the elevation of our "specialty" to the position which its scientific attainments deserve.

JOHN S. MARSHALL,	} Committee.
A. E. BALDWIN,	
J. AUSTIN DUNN,	

### FIRST DISTRICT DENTAL SOCIETY, STATE OF NEW YORK.

At a regular meeting of the First District Dental Society of the State of New York, held Tuesday evening, June 7, 1887, the following resolutions were offered by Dr. Frank Abbott, and unanimously adopted:

*Resolved*, That this society recognizes the value of the proposed meeting of the Dental and Oral Section of the International Medical Congress, and hereby expresses its approval of the same, and guarantees moral support to the movement.

*Resolved*, That we recommend that its members lend such assistance as may be needed by the officers of the Section, thereby promoting the best interests of the profession.

B. C. NASH, D.D.S., *Secretary*.

## BOSTON DENTAL COLLEGE.

THE twentieth annual commencement of the Boston Dental College was held at Parker Memorial Hall, Boston, Mass., Wednesday evening, June 22, 1887.

The annual address was delivered by Rev. James M. Gray, and the valedictory by Geo. A. Billings, D.D.S.

The number of matriculates for the session was fifty-eight.

The degree of D.D.S. was conferred on the following graduates by I. J. Wetherbee, D.D.S., president of the college:

Walter Percival Bonnell,  
George Albert Billings,  
Augustine Joseph Bulger,  
Horace Emmons Fellows,

Henry Martin Hills,  
Shirley Carolus Ingraham,  
John Munroe Sanborn,  
Charles Elmer Woodbury.

William Rice passed satisfactory examination, but was barred receiving a diploma on account of age.

## HARVARD UNIVERSITY—DENTAL DEPARTMENT.

At the annual commencement of the Dental Department of Harvard University, held at Cambridge, Mass., June 29, 1887, the degree of D.M.D. was conferred on the following graduates:

Peter Crank, L.D.S.,  
Carroll Ketcham Huntley,  
Leslie Maxwell,  
Edwin Leslie Shattuck,  
Frank Ellsworth Sprague,  
Edgar Fremont Stevens,  
Henry James Stark,

Arthur Henry Stoddard,  
Charles Henry Veo,  
John Daniel Wilson,  
Henry Eugene Windsor,  
Thomas Weston Wood, A.B.,  
Harvey Warner Woodberry,  
Charles Frederick Wright, L.D.S.

## UNIVERSITY OF MICHIGAN—DENTAL DEPARTMENT.

THE annual commencement of the Dental Department of the University of Michigan was held in the Hall of the University, Ann Arbor, Mich., June 30, 1887.

The number of matriculates for the session was ninety-six.

The degree of D.D.S. was conferred on the following graduates:

Ernest L. Avery,  
Frank C. Babcock,  
Gilbert E. Corbin,  
Edward L. Dillman,  
Almon Dewhirst,  
Elmer L. Drake,  
Fred. W. Gordon,  
David A. Harroun,  
Harry D. Heller,  
James B. Hoar,  
Almer M. Harrison,  
Fred. A. Kotts,  
Cyreno N. Leonard,  
John T. Martin,

Geo. H. Miner,  
Lewis H. McDonnald,  
Joseph L. Nordike,  
Edward E. Paxson,  
William A. Powers,  
William D. Saunders,  
Frank L. Small,  
Eva C. Smith,  
Clarence J. B. Stephens,  
James C. Stevens,  
Patrick J. Sullivan,  
Charles H. Warboys,  
William A. Wright.

## CENTRAL UNIVERSITY OF KENTUCKY—DENTAL DEPARTMENT.

THE first annual commencement of the Dental Department of the Central University of Kentucky (Louisville College of Dentistry) was held, in connection with that of the Medical Department (Hospital College of Medicine), at Masonic Temple, Louisville, Ky., on Tuesday, June 14, 1887, at 8 p. m.

The valedictory address was delivered by Charles Kelso Runyan, and the address to the graduating class by Prof. James Lewis Howe.

The degree of D.D.S. was conferred upon the following gentlemen, by L. H. Blanton, chancellor of the university :

J. C. Steen.....	Ohio.	J. W. Creed.....	Kentucky.
W. W. Steen.....	Kentucky.	W. W. Griffiths.....	Texas.
J. W. Trainor.....	Indiana.	W. P. Moore.....	Illinois.
J. Van Eldren.....	Kentucky.	E. T. Morgan.....	Florida.
J. C. Blair.....	Mississippi.	C. K. Runyan.....	Indiana.

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EDITORIAL.

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D. D. S.

FROM the time of the earliest records until the present some men have been distinguished from others by titular designations imputing peculiar fitness for leadership, teaching, healing, public service, etc., in those thus honored, whether by assumption, through inheritance, or by the suffrages of their fellows. Passing by the long line of rulers by birth, force, or assent, our present purpose relates to those characterized as professors of learning, and arranged in three groups termed respectively and respectfully the professions of Divinity, Law, and Medicine. Colleges and universities have assumed or had conferred upon them authority to determine the degree of proficiency which should qualify men to teach godly ways, or lawful ways, or healthful ways, and in those learned professions a graduate by virtue of his degrees bears the title of Doctor of Divinity, Doctor of Laws, or Doctor of Medicine, as the case may be.

During the present century the old fields of learning have been more thoroughly cultivated, and new fields discovered, thus necessitating fresh surveys of the entire domain, and the drawing of discriminating lines of partition, so that while the old divisions should be respected, the sub-divisions would include areas of sufficient extent and number to furnish corresponding doctorate titles.

The dental profession is by many deemed to be a sub-division of the general department of medicine, and by others held to be one of the newer and independent professions to which allusion has been made. It would be interesting to note in detail the rise and prog-



ress of dentistry as a profession, but our purpose relates merely to the titular designation of its practitioners as Doctors of Dental Surgery—a degree first conferred by the Baltimore College of Dental Surgery in 1841.

Less than half a century has passed, and to-day there are thousands duly authorized to affix the letters signifying the dental degree to their names, themselves representing what is best and most hopeful in the science and art of dentistry.

The advancement of dentistry in every phase of its later development has been exceptionally rapid even for this wonderful age. But the recent appearance of this youthful degree in association with the ancient and honorable diplomas of the great medical institutions is a surprise that must be startling to the most sanguine upholders of the claims of duly graduated dentists to parity of professional standing with medical graduates. What an astounding fact must it not then appear to an advocate of radical independency who within the current year declared: "And not until the degree of Doctor of Dental Surgery is recognized by the organized medical profession as entitling its holder to membership in medical organizations can dentistry be considered in any other light than an independent profession, and that condition of things is not likely ever to occur." It has occurred!

Whether, therefore, dentistry be considered as an independent profession or as a branch of medical practice, this recognition is alike complimentary. Especially is it so in view of the fact that but few of its practitioners have received their dental degrees from medical colleges, but from institutions which were authorized to confer only a dental degree.

Medicine may properly be said to include dentistry, as no one denies that the latter is a branch of the healing art; but dentistry does not include medicine. Medical colleges may without impropriety confer a dental degree on a properly qualified graduate, but a dental college may not confer a medical degree. It is not therefore to be assumed that practical equality as regards medical knowledge and fitness to practice medicine is asserted or implied in the action of the American Medical Association, and assuredly the association did not mean to assert equality with dentists as to fitness of its members to practice dentistry. That action was neither more nor less than a graceful and encouraging recognition of the fact that dental education in dental colleges had reached such a point that the national association of medical practitioners could afford to open its doors and admit to membership in its body those who had received the honors of their dental Alma Maters.

It is folly to discuss further whether dentistry is or is not a spe-

cialty of medicine. Whatever may be the relation of dentists to doctors, the practice of dentistry is based on broad ascertained facts of physiology, pathology, chemistry, materia medica, etc., and success in practice depends upon the intelligent recognition and application of fundamental facts and principles which are applicable alike to medicine and dentistry.

We offer our sincere congratulations to all who have been concerned in promoting and encouraging the commendable achievement thus signalized. But we have no sympathy with assumptions of actual equality in medicine with the class which in graceful courtesy has extended the right-hand of fellowship. There should be rather a modest self-depreciation in view of conscious imperfections, and an unflinching resolve that the standard of dental education shall in every department be raised higher and higher, until the degree of Doctor of Dental Surgery shall command for its possessor the unqualified respect and esteem of cultured men in all professions.

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#### THE SECRETARYSHIP OF THE DENTAL SECTION.

THOSE having occasion to correspond with the Secretary of the Dental Section of the International Medical Congress should note the change of personality indicated by the following communication from Dr. Bogue:

NO. 29 EAST TWENTIETH ST., NEW YORK, July 18, 1887.

TO THE EDITOR OF THE DENTAL COSMOS:

DEAR SIR: Will you please give notice that, as I am unable to continue the work of the Secretaryship of the Dental and Oral Section of the International Medical Congress, Dr. A. M. Dudley, of Salem, Mass., has kindly consented to act. All communications should henceforward be addressed to him.

Respectfully yours,

E. A. BOGUE.

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#### SOUTHERN AND VIRGINIA DENTAL ASSOCIATIONS.

WE again remind our readers that the Southern Dental Association will meet at the Hygeia Hotel, Old Point Comfort, Va., on the 30th of August.

The Virginia State Dental Association meets at the same place on the 29th of August.

Particulars in reference to these meetings were published in our July number.

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#### ANALYSIS OF STATE DENTAL LAWS.

WE publish in the following table an analysis of the dental laws of the several States as enacted to date. It gives the years of their adoption and amendments, their character and requirements as to examining boards, graduation, license, and registration. The word

"graduation" means that the applicant is admitted to practice upon presentation of a properly authenticated diploma to the board of examiners, and the word "license" means that the applicant must pass a satisfactory examination before the board. We have prepared the table as a brief answer to many inquiries from correspondents both at home and abroad:

STATE.	YR.	AUTHORITY RECOGNIZED.	REQUIREMENT.	REGISTRATION.
Alabama.....	{ 1841 1881 1887	Examin'g Board.	License from the Board.	Probate Court.
Arkansas.....	1887	" "	License from the Board.	Books of the Board.
California.....	1885	" "	Graduation or License.	County Clerk.
Connecticut....	1887	No Exam. Board.	Grad'n or six years' practice.	.....
Dakota.....	1885	Examin'g Board.	Grad'n or License.	Register of Deeds.
Delaware.....	1885	" "	" " "	Books of the Board.
Florida.....	1887	" "	License from the Board.	Clerk Circuit Court.
Georgia.....	1872	" "	Grad'n or License.	Books of the Board.
Illinois.....	1881	" "	" " "	County Clerk.
Indiana.....	{ 1879 1887	" "	" " "	County Recorder.
Iowa.....	1882	" "	" " "	County Clerk.
Kansas.....	1885	" "	Grad'n required.	Books of the Board.
Kentucky....	{ 1867 1868	" "	Grad'n or Certificate State Dental Association.	Books of the Ass'n.
Louisiana.....	1880	" "	Grad'n or License.	Books of the Board.
Maryland....	{ 1884 1886	" "	" " "	" " " "
Massachusetts..	1887	Board of Regist'n.	License from the Board.	" " " "
Michigan.....	1883	Examin'g Board.	Grad'n or License.	" " " "
Minnesota.....	1885	" "	" " "	Clerk County Court.
Missouri.....	1883	No Exam. Board.	Grad'n required.	" " " "
Mississippi.....	1882	Examin'g Board.	Grad'n or License.	Books of the Board and Recorder of Deeds.
Nebraska.....	1887	No Exam. Board.	Grad'n required.	County Clerk.
N. Hampshire..	1877	Board of Censors.	Grad'n or License.	" "
New Jersey..	{ 1873 1880 1884	Examin'g Board.	Grad'n required.	" "
New York....	{ 1879 1881	No Exam. Board.	Certificate State Dental Society, Dental or Medical College.	" "
N. Carolina.....	1879	Examin'g Board.	Grad'n or License.	Books of the Board.
Ohio.....	{ 1868 1873	No Exam. Board.	Grad'n or Certificate State Dental Society.	.....
Oregon.....	1887	Examin'g Board.	Grad'n or License.	County Clerk.
Pennsylvania {	1876 1883	" "	" " "	County Recorder.
S. Carolina.....	1875	" "	" " "	Books of the Board.
Vermont.....	1882	" "	" " "	Secretary of State.
Virginia.....	1886	" "	" " "	Books of the Board.
W. Virginia....	1881	" "	" " "	" " " "
Wisconsin.....	1885	" "	" " "	" " " "



## STATUS OF DENTISTS IN THE MEDICAL CONGRESS.

THE following statement and explanation by Dr. Taft will be read with interest by the profession at large, and especially by those who are interested in the Dental Section of the approaching International Medical Congress:

### EXPLANATORY STATEMENT.

At the recent meeting of the American Medical Association, at Chicago, the following resolution was adopted by an almost unanimous vote:

*Resolved*, That the regular graduates of such dental and oral schools and colleges as require of their students a standard of preliminary or general education and a term of professional study equal to the best class of medical colleges of this country, and embrace in their curriculum all the fundamental branches of medicine, differing chiefly by substituting practical and clinical instruction in dental and oral medicine and surgery instead of clinical medicine and surgery, be recognized as members of the regular profession of medicine, and eligible to membership in this association on the same conditions and subject to the same regulations as other members.

This resolution is plain and comprehensive. Learning, however, that there is still uncertainty in the minds of some as to the rights, privileges, and status of regular graduates of the class of dental colleges specified in the resolution, in the Ninth International Medical Congress, it is deemed right and proper to say that the graduates of all dental colleges whose requirements conform to the above resolution are considered as members of the medical profession, and are eligible to membership in the American Medical Association; that they may register and take out cards of membership, according to the general regulations, precisely upon the same terms and under the same conditions as those who hold the degree of M.D.

Dental practitioners, who according to the above resolution are not graduates, but are recommended by members of the council, become members of the Section and Congress upon invitation, authorized by the Executive Committee. The membership of the XVIIth Section differs in no respect from that of any other Section of the Congress, and members have the same rights, privileges, and status.

Without doubt a large portion of those who have received notice that they will be invited are fully qualified according to the above resolution. Whether all are cannot now be determined, nor is it important that it should be. It is desirable to have present all who have been selected for membership; it is also hoped that those who are qualified according to the resolution will become members, and those who have not this special qualification, but have high attainments in the science and practice of dentistry, may become members the same as any other scientific men.

Invitations will soon be sent to all who have signified a willingness to accept an invitation, and though for many it is not necessary, yet it is thought best to adhere to the original plan.

Should there be any who have delayed in complying with the request of the circular of Dr. F. H. Rehwinkel in regard to invitations, they are requested to do so speedily.

J. TAFT, of Section XVII, I. M. C.

THE following communication settles definitely the basis of admission of dentists—graduates—to membership in the Congress:

WASHINGTON, D. C., July 18, 1887.

TO THE EDITOR OF THE DENTAL COSMOS:

DEAR SIR: Dr. Bodecker, of New York, and I called on Dr. J. B. Hamilton,

Secretary General of the Ninth International Medical Congress, at his office, and there met two members of the Registration Committee of the Congress.

We were authorized by them to say that the Registration Committee considered the question of the admission of dentists to membership in the Congress clearly and definitely settled by the resolution adopted by the American Medical Association; that, in accordance with the resolution, dental graduates can register and take out tickets of admission the same as medical graduates, and that a form of registration has been prepared in which the dentists will register as "special practitioners."

Will you please insert this in the August number of the DENTAL COSMOS for general information, and also state that the meetings of Section XVII will be held in the Church of Our Father, corner of Thirteenth and L streets, and the clinics and exhibits in the Franklin School Building, corner of Thirteenth and K streets.

Yours respectfully,

R. FINLEY HUNT, D.D.S.

### THE MEDICAL CONGRESS AND THE TARIFF LAW.

THE following communication from Secretary Fairchild will be found of special interest to foreigners who contemplate attendance at the Ninth International Medical Congress at Washington:

TREASURY DEPARTMENT, OFFICE OF THE SECRETARY,  
WASHINGTON, D. C., June, 1887.

*Prof. John B. Hamilton, M.D., Secretary General, Ninth International Medical Congress, Washington, D. C.:*

SIR: In reply to the inquiries contained in the letter of F. H. Rehwinkel, M.D., referred by you to this department, I have to state that the professional books, implements, instruments, etc., of persons arriving in the United States are exempt from duty under the provisions of the tariff law, which also provide for the free admission of "models of inventions and other improvements in the arts, such as cannot be fitted for use," and that parties arriving from foreign countries for the purpose of attending the Ninth International Medical Congress to meet at Washington September 5, 1887, and who bring with them their own "surgical or dental instruments, scientific and mechanical appliances, models and materials, to be used for clinical demonstration under the direction of said Congress," will be entitled to have the same passed free of duty, on the usual oath that they are for their personal use and are not intended for sale.

As it would appear, from the act of Congress relative to said convention, that the said Ninth International Medical Congress is a society established for philosophical and scientific purposes, books, maps, and charts (not more than two copies in any one invoice), philosophical and scientific apparatus, instruments and preparations, casts, paintings, drawings and etchings, specially imported in good faith for the use of said Congress and not intended for sale, would also seem to be entitled to free entry under the provisions of the tariff act now in force, a copy of which is herewith enclosed. (See paragraphs 660, 759, and 815.)

Copies of this letter will be transmitted to the Collectors at the principal ports for their information and guidance.

Respectfully yours,

(Signed)

C. S. FAIRCHILD, *Secretary.*

## TOLERANCE.

REV. PHILLIPS BROOKS, in a recent lecture before a divinity school on "Tolerance," gave a luminous definition of this somewhat rare quality, which in his judgment was of interest to theological students above any other class of men.

Without questioning the comparative importance of a nice appreciation by one class more than another of the virtue referred to, we commend it as of interest to all, especially to professional men of whatever department. Dr. Brooks is thus reported:

Tolerance must not be confounded with toleration. Tolerance is the disposition, and toleration the way it is used. The keynote of tolerance is found in positive conviction and in sympathy and intelligent understanding. It has been long supposed that to be tolerant of others we could not be bigots, but I believe the deeper our creed is within us the better able are we to bear with what we believe to be the mistaken opinions of others. Charles James Fox voiced the popular idea when he said skepticism is necessary to tolerance. He was wrong. Earnest, honest conviction is needed to feel true tolerance. Frederick Maurice said tolerance was charity founded on the uncertainty of truth, and Dr. Holmes has written that tolerance is the insult one set of well-behaved people pay to another set of well-behaved people. This is entirely a mistaken idea. I do not insult my friend with whom I differ in opinion because I allow him to maintain it without condemning him to the axe or firebrand. Both of us have earnest conviction and personal intelligence, which are the great essentials towards a proper forbearing spirit.

There are many qualities of tolerance, which I would divide under six heads. The first is the lowest form of all, pure indifference. The second is the tolerance of policy, as when Burke spoke of toleration as a strong factor in politics. The third is the toleration of helplessness, and the fourth the toleration of manliness, that human respect we have for one another. The fifth is tolerance of sympathy, —that is, when we know others mean well and are trying to do what they hold is right, though we think they are mistaken. And the sixth quality is that tolerance which grows with a knowledge that truth is larger than our powers of conception, and that others may have some of it besides ourselves. . . . I would give this as a definition of the virtue upon which I have spoken: It is the willing consent that others may hold and express opinions contrary to our own until they are convinced of their error by argument and reason.

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 FLORIDA DENTAL LAW.

FOLLOWING is the text of the bill entitled "an act to provide for the appointment of a board of examiners of dentists, and to regulate the practice of dentistry in the State of Florida," which has been passed by the Legislature of the State and become a law:

*Be it enacted by the Legislature of the State of Florida:*

SECTION 1. That from and after the passage of this act it shall be unlawful for any person to engage in the practice of dentistry in the State of Florida unless



said person shall have obtained a certificate from a board of dentists, duly authorized and appointed under the provisions of this chapter to issue license.

SEC. 2. Be it further enacted, That the board of examiners shall consist of five (5) dental graduates or practitioners of dentistry, appointed by the Governor, and who are members in good standing of the Florida State Dental Association; provided, that said graduates or practitioners have been practicing in the State of Florida for a term of not less than three (3) years. Said board shall be appointed to serve two (2) years. The president of said board shall have power to fill all vacancies in said board for unexpired terms.

SEC. 3. Be it further enacted, That it shall be the duty of this board: First, to meet annually at the time of the meeting of the Florida State Dental Association, or oftener at the call of any three members of said board; thirty days' notice must be given of the annual meeting; secondly, to prescribe a course of reading for those who study dentistry under private instructors; thirdly, to grant license to all applicants who undergo a satisfactory examination; fourthly, to keep a book in which shall be registered the names of all persons licensed by said board to practice dentistry in the State of Florida.

SEC. 4. Be it further enacted, That three members of said board shall constitute a quorum for the transaction of business, and should a quorum not be present on the day appointed for their meeting, those present may adjourn from day to day until a quorum is present.

SEC. 5. Be it further enacted, That one member of said board shall have the power and may grant a license to an applicant to practice dentistry until the next regular meeting of said board, when he shall report the fact, at which time the temporary certificates shall expire, but such temporary certificates shall not be granted by a member of the board after the board has rejected the applicant.

SEC. 6. Be it further enacted, That any person who shall, in violation of this act, practice dentistry in the State of Florida, shall be deemed guilty of a misdemeanor, and upon conviction shall be punished by a fine of not less than twenty-five dollars nor more than five hundred dollars; provided, that nothing in this act shall be construed so as to prevent any person from extracting teeth; and provided further, that none of the provisions of this act shall apply to regularly licensed physicians and surgeons in practice at or prior to the passage of this bill.

SEC. 7. Be it further enacted, That every person practicing dentistry in the State of Florida shall, within six months after the passage of this act, register his name, together with his post-office and the date of his certificate, in the office of the clerk of the circuit court of the county in which he practices, and shall, on the payment to such clerk of a fee of fifty cents, be entitled to receive from him a certificate of such registration.

SEC. 8. Be it further enacted, That every person practicing dentistry in the State of Florida at or prior to the passage of this bill shall be entitled to receive from the board of examiners a certificate to practice without undergoing an examination, on application by letter or otherwise; provided, that all such persons make application to said board within six months after the passage of this act.

SEC. 9. Be it further enacted, That all laws and parts of laws in conflict with this act be and they are hereby repealed.

## BIBLIOGRAPHICAL.

TRAITÉ DE PROTHÈSE BUCCALE ET DE MÉCANIQUE DENTAIRE. Par E. ANDRIEU, docteur en médecine de la Faculté de Paris, président de l'Institut Odontotechnique de France, etc. Avec 358 figures intercalées dans le texte. Octavo, pp. 593. Paris: Octave Doin, éditeur, 1887.

The author's familiarity with dental works which he has translated for publication in French and his experience as a dentist in practice have conjointly enabled him to produce this volume of nearly six hundred pages, and containing three hundred and fifty-eight illustrations relating to a comprehensive system of Buccal Prosthesis, embracing nearly every form of mechanical substitution for maxillary dependencies, including lost portions of the maxillæ themselves. We should anticipate for the work a prominent place in the list of text-books for French dental colleges, and can commend it to French reading dentists in every country as an aid in thorough equipment for every emergency in prosthetic practice.

Messrs. P. Blakiston, Son & Co., of Philadelphia, have the volume for sale in the United States.

PUBLIC HEALTH: The Lomb Prize Essays. Award made at the Thirteenth Annual Meeting of the American Public Health Association, Washington, D. C., Dec. 10, 1885. With an Appendix. Second edition. Concord, N. H., 1886.

This volume comprises the following essays:

I. Healthy Homes and Food for the Working Classes, by Victor C. Vaughan, M.D., Ph.D., professor in the University of Michigan.

II. The Sanitary Conditions and Necessities of School-Houses and School-Life, by D. F. Lincoln, M.D., Boston, Mass.

III. Disinfection and Individual Prophylaxis against Infectious Diseases, by George M. Sternberg, M.D., major and surgeon U. S. Army.

IV. Preventable Causes of Disease, Injury, and Death in American Manufactories and Workshops, and the Best Means and Appliances for Preventing and Avoiding them, by George H. Ireland, Springfield, Mass.

These are subjects of vital importance. The principles which underlie the promotion of the health of the community at large, in which is included the well-being of the individual, should be known to every one. These papers, which have been subjected to the critical examination of well-known scientists, have been adjudged not only the best presentations of the various topics offered, but worthy to be placed before the public with the approval of the American

Public Health Association. They have therefore been published in pamphlet form to be sold at cost. Any one of the essays can be had for 10 cents; in quantities a much lower price is made. Individuals or associations interested should communicate with the secretary of the association, Dr. Irving A. Watson, Concord, N. H.

**NINETEENTH CENTURY SENSE: The Paradox of Spiritualism.** By JOHN DARBY. Philadelphia: J. B. Lippincott Co., 1887. Price, cloth, \$1.00.

We have here, in a neat 12mo of 222 pages, an addition to the list of literary productions by Dr. J. E. Garretson.

We cannot better briefly characterize this volume than in an extract from the author's introductory, in which he says that in these three irrefutable aphorisms is the foundation of what is offered,—all knowledge obtainable out of what is ordinarily esteemed learning resting with these three premises:

“Common sense is little better than no sense at all.

“He who knows himself knows all things in himself.

“A thing is to the sense that uses it what to the sense it seems to be; it is never anything else.”

Attention is thus brought to the publication and to the character of this volume because of the author's association with dental education; our rule limiting notices of new books to those only which have relation to dental matters prohibiting more lengthy comments.

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## OBITUARY.

### DR. J. R. WALKER.

DIED, at Bay Saint Louis, Miss., June 22, 1887, DR. J. R. WALKER.

A tender and faithful husband, a kind and loving father, a sincere and true friend, he was devoted to his profession, which he loved next to his family. He had the courage of his convictions, and in his ardent nature maintained them with zeal, and often with enthusiasm. He was not perfect, as none of us are, but his mistakes may be attributed to this trait in his character, for he always pursued the course that he thought was right.

Let us extend our sympathy to his family, who have sustained the greatest loss, and keep green the memory of his many virtues.

R. F. H.



## PERISCOPE.

**HUMAN TEETH AND EVOLUTION.**—Are we in danger of becoming toothless as a result of the evolution of the human race? Biologists tell us that human jaws contain a smaller number of teeth now than they did in days gone by, and this, in connection with the increasing deterioration of the teeth of civilized people, as testified by dentists, certainly gives color to the fear expressed above. The first statement made has been explained by the assertion that the evolution of brute into man was accompanied by a change in his dentition as a natural result of his altered mode of life. That, of course, cannot concern us now, for we are unable to alter the past, although we can profit by the lessons it teaches, and certainly no one desires the return of man to a brute stage. The second assertion, however, is of immediate consequence to us,—here we deal with the present as well as with the future, and it therefore deserves the fullest attention; and a thorough discussion of all theories advanced may teach us a useful lesson of how to avoid the prospective evil.

Each one of the different theories advanced to explain why teeth decay so rapidly at our present stage of civilization finds its adherents and facts to demonstrate its correctness, while others likewise find facts to prove that that particular theory is to explain all. "Too much sugar or candy is eaten," we are told; but experience teaches us that few better dentifrices exist than sugar-cane, and the "ivories" of the slaves working in the sugar plantations are a matter of history. The fact that the sugars and candies eaten to-day are to a certain extent adulterated with glucose, or perhaps with other substances more or less injurious to the body, does not change the matter in any way, as far as the teeth are concerned. All other things being equal, there seems to be no valid reason why a sugar diet should set up more rapid or more destructive fermentation in the mouth, if minute quantities of it are retained between the teeth, than could be produced by an equal portion of bread; the difference should rather be in favor of the former, as bread particles will lodge far more readily than sugar, which dissolves rapidly and is carried away by the saliva.

"You eat too much salt," another theory tells us; and yet where is more salt eaten than among ocean sailors? And they, as a class, know very little, if anything, about toothache. It may be that the prevailing habit of tobacco-chewing among them has something to do with keeping the mouth in an aseptic condition; but salt is known to possess similar qualities, and if it had any evil effects on the teeth, tobacco alone could hardly prevent its destructive action.

"Bread from the whole wheat flour, such as was made in our mothers' time in the old-fashioned stone mill, contains a certain quantity of mineral salts, which your modern white flour has lost in the process of roller milling; hence the latter does not contain the substances necessary for the well-being of the teeth, while the former does; and as everybody eats white flour bread now-a-days, we can easily account for the increasing deterioration of the teeth." Thus runs another theory, and it would have force if we lived on

bread alone; but we do not; we eat quantities of other substances besides. Moreover, if a food is capable of furnishing the mineral salts necessary for the maintenance of *all* the bones, it ought to be sufficient to supply an additional few ounces of teeth as well. If decayed teeth and rachitis always went together, then the above assertion might be accepted as fully demonstrated, but as the statistics for bad teeth and for rachitis are entirely out of proportion, this theory will not explain all, although it may find its application under certain conditions. In sections of the country where bread from poor white flour forms the bulk of the food to the exclusion of everything else, its influence upon bones and teeth must appear simultaneously; otherwise, all other things being equal, we may assert that a food is good enough in quantity and quality to supply the whole body with the material necessary for its growth and maintenance, with the exception of the finger tips, which perish for want of proper nourishment. Any such assertion would be looked upon as ridiculous; yet we are supposed to accept a similar statement with regard to our teeth.

"The constant use of the tooth-brush, the most scrupulous cleanliness," is finally the banner around which all rally; but, without saying anything against it, it does seem rather strange that on an average the best teeth are found among those tribes and races who are as yet in blissful ignorance of tooth-brushes. Most of us have seen skulls of savages with teeth ground down to the gums, but all in prime condition, hard and strong; yet no anthropologist has so far discovered any implement in the mounds and graves of such savages that held even the faintest resemblance to a tooth-brush. Who that has traveled in Germany has not heard of the famous "schwarzbrot-zaehe" (rye-meal bread teeth), proverbial as a designation for brilliant teeth; but the population of the districts that claim such a distinction consists mostly of a farming population, hard working and not too well off in the world's goods. They make four out of their five daily meals upon rye-meal bread, baked at intervals of from four to six weeks, yet it is very much to be doubted whether one in a hundred is the happy possessor of a tooth-brush or feels any necessity for such an article. But their teeth are beautiful, nevertheless.

Instances of such character could be multiplied, but the above cases can be considered fair samples to show that as a rule those people who are *least* acquainted with the so-called hygiene of the teeth are the happy possessors of the soundest dentition.

How, then, shall we find our way out of this dilemma of conflicting views? Can only the constant attendance of a skillful dentist check the growing evil of bad teeth and prevent the development of a toothless race of men? Or can we discover some true hygienic law, something that will strengthen the teeth from within out, something that does more than merely polish the surfaces?

If any law in biology is accepted by all modern investigators, it is the law that "*use determines the form as well as the strength of an organ.*" And this we find illustrated everywhere and every day. We can develop increased chest capacity as well as general muscular strength by careful and systematic training, while both deteriorate when occupation or position prevent their exercise. Our

vision improves or weakens according to the use we make of our eyes; the sense of touch can be trained so that even very minute differences in weight and structure can be detected; a musician can distinguish notes inaudible to the untrained ear,—in fact, all the organs of the body, at least those which are under the control of the will, are susceptible of improvement within certain limits by a judicious training, by a *legitimate use*, while they all deteriorate or weaken when condemned to inactivity, to non-use.

And what about our teeth? Nobody will dispute that they are organs developed for the purpose of crushing food; cells specialized to cut or grind substances more or less hard; and why should they be exempt from the law which holds that "the strength of an organ depends on its use?" Why should we be willing to recognize the law for every other part of our body and refuse to admit its operation in our teeth—organs both useful and ornamental? They are specialized to exert their power upon *hard* substances, and like other organs and organisms they try to adapt themselves to their surroundings; they will gain strength by use and weaken by non-use.

Bearing this in mind, we can, perhaps, arrive a small step nearer the question why advancing civilization so apparently increases the number of bad teeth, for although their actual diseases may have existed in prehistoric times as well as they do now, their percentage is certainly largely on the increase. As civilization advances our food is prepared with more and more care; hard substances are softened, tough particles are rejected, and everything is reduced to a mere pulp or pulpy consistence, whereby the legitimate work of our teeth is reduced to the minimum. And what are the consequences? No longer called upon to perform the office of crushing *hard* substances, they soften. They feel that there is no necessity for presenting a dense, hard material, because the work for the performance of which they were specialized is performed for them by the cook, and the results are "soft teeth,"—teeth less hard and resistant than those in a normal condition; teeth which will now deteriorate and will finally disappear altogether for the want of use.

Such a weakened condition of course does not produce decay, but, like other organs or organisms in a state of poor health, soft teeth are more susceptible to outside injurious influences than those in a normal and vigorous condition; and bacteria, which would be unable to thrive on or among sound, healthy teeth, will find a fertile soil in the weakened and softened substance of the enamel and dentine, and thus produce all the various forms and varieties of ills known to modern dentistry.

What are we to do? A preventive medicine would be, "Use the teeth." The eating of sugar-cane as a dentifrice means the mastication of the cane; the hard bread eaten by sailors keeps their teeth in good condition, because such food means very energetic biting; four meals a day on rye bread presupposes a prolonged use of the organs of mastication, and the brilliant "*schwarzbrot-zahne*" are the immediate results; it is not the friction of food upon the teeth, for that could as well be supplied by a tooth-brush, but the legitimate use of the organs, which determines their strength in all these cases.



Unfortunately, we cannot make people eat hard bread unless they are willing to do so, and as long as we have the conviction that a skillful dentist is able to do all that can be done to preserve our teeth, we will find the majority of men unwilling to attempt any systematic training in that line, but we need not lose courage on that account. Only in recent years have men arrived at the understanding that a certain quality of physical exercise is necessary for their well-being, and that a well-developed body is capable of withstanding many forms of disease far better than one unused to muscular activity of any kind. In the course of time men can be made to understand that the labor of mastication is equally necessary for the preservation of their teeth; for, after all, hard bread tastes just as good as soft bread does as soon as the muscles of mastication have adapted themselves to their legitimate work. It is a matter of common observation that old people with good teeth generally eat bread-crusts; but cause and effect are confounded here, for they do not eat bread crusts because they have good teeth, but they have good teeth because they have eaten bread-crusts all their lives, and thus, by constant use, have retained their dentition in a normal healthy condition. The foundation for bad teeth is generally laid in early childhood; for numberless mothers and nurses very carefully soften the food or remove the crust from the bread before giving it to the little folks, because it otherwise may "hurt their teeth," and so the child grows up with a set of unused organs in its mouth, and when we have finally succeeded by the creation of artificial conditions in producing weak organs, then we wonder why the poor child has such bad teeth, and why it is so often suffering with toothache, and why the dentist's bill is so high.

Teeth are organs specialized to perform the work of mastication; they are subject to the same laws that govern other organs, and their strength is determined by their use. Understanding this, we are obliged to admit that if we ever become a toothless race it will be our own fault; knowing the danger, we can avoid it; we can take precautionary measures and teach our children that a certain quantity of training of our masticatory organs is just as necessary as general physical exercise; and if we can make them understand that such a simple course will save them from many physical as well as mental sufferings entailed by numberless aches and diseases, and good-looks destroying bad beeth, then we need not fear that the evolution of man will ever result in the production of a toothless race.—*Julius Pohlman, M.D., of the University of Buffalo, before the Society of Natural Sciences; reported in N. Y. Med. Press.*

**DISEASES OF THE ANTRUM.**— . . . The only normal opening from the antrum is into the middle meatus of the nose, and this is shown on the section of the skull before you, on one side with the mucous membrane *in situ*, and on the other with it removed. The size of the aperture found in a macerated superior maxilla gives a very exaggerated idea of the opening in the articulated skull, where it is encroached upon by the palate, inferior turbinate, and ethmoid bones, which narrow and subdivide the opening into two parts. In the recent subject these are covered in by the mucous membrane of the nose, so that ordinarily there is only a small oblique aperture

left in front of the unciform process of the ethmoid, and close behind the infundibulum. It should be observed that this opening is at the upper part of, and not near the floor of, the antrum, and that it opens into the middle meatus of the nose. Occasionally a second smaller aperture is found behind this, and nearer to the floor of the sinus, which has always been regarded as a natural formation. M. Giraldès, however, in his *Recherches sur les Kystes Muqueux du Sinus Maxillaire* (Paris, 1860), maintains that the posterior opening, when it exists, is always the result of pathological change, and that the anterior opening is into the infundibulum, and not into the meatus itself. I believe that slight variations in the position of the opening exist; but it is undoubted that the aperture is very minute, and quite inaccessible from the nose.

Highmore describes the antrum as "a hollow, spherical or somewhat oblong in shape, and large enough to hold the terminal phalanx of the great toe." The fact is, that the size of the antrum is very variable, and this point was carefully investigated some years ago by the late Mr. W. A. N. Cattlin, F.R.C.S., who published a valuable illustrated paper in the *Odontological Society's Transactions*, Vol. ii.

As the result of the examination of a hundred specimens, Mr. Cattlin found that, as a rule, the antrum is larger in the male than in the female, and that it diminishes in size with extreme age. In the young subject likewise the cavity is small, and its walls comparatively thick.

A large adult antrum may be capable of containing eight drachms of fluid, whilst a small adult antrum containing only one drachm of fluid has been seen. The two antra are often unsymmetrical in size and shape. The antrum may even extend irregularly into the malar bone, forming a supplementary cavity there; but the most remarkable variation is due to the development of the ridges of bone which subdivide the cavity; these are very variable in size and shape. Fossæ of considerable depth are often found in the floor of the antrum, particularly at the anterior and posterior extremities. A rare form is when fossæ or cells are developed beneath the orbital plate, or a *cul de sac* is formed close to the lachrymal groove.

*Suppuration in the antrum*, or, as it is sometimes termed, *abscess*, is ordinarily the result of inflammation extending from the teeth to the lining membrane of the cavity; and the disease might, therefore, be not incorrectly termed an empyema, as proposed by Otto Weber. The roots of the first and second molars often, and the bicuspid and cuspid occasionally, form prominences in the floor of the antrum; and when these teeth become carious, the thin plate of bone covering their roots not infrequently becomes affected, and disease is set up in the cavity. The roots of the first molar are occasionally found in health to be uncovered by bone, and to project beneath the lining membrane of the antrum; and, under these circumstances, irritation and inflammation would be still more likely to occur. But an abscess may be formed in the alveolus, and eventually burst into the antrum, though connected originally with teeth not usually in relation with the cavity.

The symptoms of suppuration in the antrum are at first simply

those of inflammation of the lining membrane—dull, deep-seated pain shooting up the face and to the forehead, tenderness of the cheek, with some fever and constitutional disturbance; but occasionally the pain is most acute, and of a sharp, stabbing, neuralgic character. A slight rigor may usher in the formation of matter, which will find its way into the nostril when the patient is lying on his sound side, either through the normal aperture or through an opening caused by absorption, as maintained by M. Giralès. An offensive odor is now sometimes perceptible to the patient, though not to those around him—thus differing markedly from what occurs in ozæna—and a sudden discharge of matter from the nostril, when blowing the nose, may relieve all the symptoms for the moment. The more common course of events is, however, that without any acute pain the patient notices that he has a purulent discharge from the nose when blowing it, and perhaps is aware that, when lying down, the discharge finds its way into the throat. This latter point is often overlooked, however, though there may be a complaint of a very disagreeable taste in the mouth and a tendency to nausea in the morning, with a hawking up of pellets of inspissated pus.

With all this there is no distension of the antrum, and it is this fact which frequently misleads the practitioner. It is certain, however, that in health there is invariably an opening between the antrum and the nostril; and that, even when this is closed, the wall is very thin and readily absorbed; and it is quite exceptional, therefore, when the antrum is so distended with pus as to give rise to any prominence of the cheek. Undoubtedly cases of this kind have been recorded, but it may be doubted whether some of them were not examples of cyst, the contents of which had become purulent; for we know that cysts in the wall of the antrum readily produce great deformity. The natural opening into the nose is not at the level of the bottom of the cavity of the antrum; and hence there is always a small residuum of discharge, which the patient can only partially get rid of by holding the head on one side.

Given a patient who complains of purulent discharge from the nostril, with occasionally a disagreeable smell, and the case is too apt to be put down as one of ozæna, and treated by nasal douches, snuffs, etc. But, as already mentioned, the offensive smell is perceived only by the patient, and not by his friends, the reverse being the case in ozæna; and, again, the discharge is only occasional, is determined by the position of the head, and is simply purulent, whereas in ozæna the discharge is constant, and mixed with offensive crusts from the nasal cavities. Again, the dull ache, varied occasionally by acute pain, is apt to be referred to the teeth alone, and the most careful examination may fail to detect any special tenderness in any one tooth. Hence, after exhausting the usual routine remedies for neuralgia, I have known wholesale extraction of useful teeth undertaken with no benefit, unless it should fortunately happen that the tooth which has perforated the antrum should be extracted early, when the discharge of pus at once clears up the nature of the case.

A still more serious result may ensue if the neuralgia should, as it often does, take the form of frontal headache, and thus lead the surgeon to suppose that the discharge comes from the frontal sinus. I



have twice been consulted in cases in which enterprising surgeons had proposed to trephine the frontal sinus, regardless of the serious injury to the patient's good looks, for chronic discharge which I proved to be solely due to suppuration in the antrum.

The more ordinary consequence, however, of an unrecognized empyema of the antrum is the damage done to the digestive organs by the constant swallowing of purulent fluid during sleep. Under these circumstances the patient is always ailing, is unable to take food in the morning, and may be reduced to a state of great prostration even dangerous to life. The usual remedies for indigestion are likely to be of little service so long as the purulent drain continues.

In exceptional cases the pus, not finding an exit, distends the antrum, causing partial absorption of the walls, and thus both bulging out the cheek and thrusting up the floor of the orbit. Under these circumstances, the affection is readily recognized by the peculiar crackling which is perceived when the thinned bone is pressed upon, and the matter, if not evacuated, will shortly find a way out for itself, either by the side of the teeth, through the front wall of the antrum, or through the floor of the orbit; in either of which cases considerable necrosis and ultimate scar are likely to be the consequences. The possibility of both antra being affected either simultaneously or consecutively must not be overlooked.

The elevation of the floor of the orbit already described may simply displace the eyeball and render it temporarily blind, as in a case recorded by Mr. J. Smith, of Leeds (*Lancet*, February 14, 1857), or it may lead to permanent amaurosis—a point to which Mr. Salter called special attention in the *Medico-Chirurgical Transactions* for 1862.

The treatment of suppuration of the antrum consists, in the first place, in the extraction of all decayed teeth or stumps in the affected jaw, and with this object in view those teeth which are apparently sound should be tested by a sharp knock with some metal instrument, when, if tender, they should be extracted. If the cause of the mischief be removed in time, the inflammation will subside under fomentation and the application of a leech to the gum; but if matter has formed, it must be evacuated without delay. If the extraction of a tooth is followed by the flow of pus, the enlargement of the aperture in the socket by the introduction of a trocar is at once the readiest and simplest mode of evacuating the matter; but if all the teeth are apparently sound, it will be advisable to perforate the alveolus above the gum with a trocar, gimlet, or strong pair of scissors, and similar treatment would be required in the rare case of suppuration occurring after loss of the teeth in old people. If it be determined to sacrifice a tooth, the first molar is to be preferred for extraction, both on account of the depth of its socket and also because, as mentioned by Salter, it is more liable to decay than the other teeth. In puncturing through the socket of a tooth with a trocar, it is well to gauge the depth to which the instrument may safely go with the fingers of the hand which grasps it, lest injury should be unwittingly inflicted on the orbital plate by the trocar entering unexpectedly, or a trocar with a stop may be employed if preferred.

After considerable experience of both methods, I prefer the puncture above the alveolus, except when a tooth obviously requires ex-

traction, because I find that the aperture is less liable to close up than when made through the alveolus, and because food is less likely to find its way into the antrum. It is necessary, however, not to direct the trocar quite horizontally, but a little upwards, lest in a case of highly-arched palate the floor of the antrum should be injured, as I have known on one occasion, but then fortunately with no permanent damage, except the exfoliation of a minute portion of the palate.

Whatever method may be adopted for emptying the antrum, it is important that the cavity should be thoroughly cleansed by the forcible injection of warm water until it runs freely from the nostril. For this purpose an ordinary glass syringe is quite insufficient, but I have satisfactorily employed an ordinary Eustachian catheter for the purpose, to which an india-rubber injecting bottle is adapted. After a time, and with a little instruction, patients can learn to dispense with the syringe by forcing a mouthful of water through the antrum by the action of the buccinator muscles. After thoroughly cleansing, some detergent and slightly astringent lotion should be injected to restore the healthy condition of the mucous membrane, and for this purpose weak solutions of permanganate of potash or sulphate of zinc answer admirably; but these cases are exceedingly tedious, as a rule, and take many months for their cure. If the perforation has been made through the socket of a tooth, care must be taken that particles of food do not gain admission to the antrum, and this may be accomplished by plugging the hole with cotton-wool, or, as suggested by Salter, by fitting a metal plate to the mouth with a small tube to fill the aperture, which can be corked at pleasure, and will serve as a pipe for injection.

Ordinarily the pus is readily evacuated through the nostrils, but I have seen large masses of offensive inspissated pus block up the opening into the nose and require very forcible and repeated syringing for their removal; and the same thing applies to clots of blood, which occasionally give trouble. A still more serious event is when a mass of inspissated pus gives rise to symptoms closely resembling those of a tumor of the upper jaw, and without producing that absorption which gives rise to the crackling characteristic of the presence of fluid. The following case of this kind occurred in my own practice, and the late Mr. Mason published a very similar one. A woman, aged 43, was admitted under my care, complaining of pain and swelling of the left side of the face. There was an ill-defined swelling over the region of the left upper jaw, and the angle of the mouth on that side was drawn downwards. The swelling was both hard and tender; the skin over it appeared unaffected. In the mouth there was a tense, elastic, and tender swelling over the left half of the hard palate, displacing the alveolar process downwards. Slight discharge oozed from a small opening in the mucous membrane opposite the last upper molar, the swelling being softer about this spot than elsewhere. The left nostril was blocked, its external wall being pushed inwards, and the patient complained of some discharge from it. The neighboring lymphatic glands were not enlarged, and, with the exception of occasional pain in the tumor, the patient suffered no inconvenience, her general health being excellent.

She had noticed the swelling for about two years, and its com-

mencement was attributed to exposure to cold. At times the swelling increased and became more troublesome, especially after prolonged overwork. No history of syphilis could be obtained, and her family history was good.

Believing that I had to deal with a solid tumor of the jaw, I made an incision through the upper lip in the median line, prolonging it into the nostril of the affected side. The alveolus and hard palate having been divided with saw and bone-forceps, a way was made into the latter, and a pulaceous offensive mass, about the size of a hen's egg, was turned out with the finger. On microscopical examination this was found to consist of fatty *débris*, granular pus-cells, and acicular crystals. As the larger portion of the left half of the hard palate was partially loosened and absorbed, it was removed with the forceps. The cavity of the wound was stuffed with a strip of lint, and the patient made an uninterruptedly good recovery.

The possible subdivision of the floor of the antrum by bony septa, already described, must be borne in mind in operating upon this cavity, and especially if there is reason to suspect the presence of any foreign body which may be keeping up irritation. In his paper already referred to, Mr. Cattlin narrates the case of a root of a tooth lodging in one of these subdivisions, from which it was extracted with difficulty.—*Abstract of Lecture by Christopher Heath, F.R.C.S., in British Medical Journal.*

**OIDIUM ALBICANS.**—H. T. L., physican, æt. 30, fairly nourished, habits good, bowels regular; subject to sick headache every three or four weeks; inveterate smoker

About August 1, 1886, noticed that tongue and roof of the mouth were sore. Supposed it was due to smoking a pipe; examination showed several white patches on mucous membrane of hard palate and one on the apex, and one on the base of the tongue. They were irregular in outline, and but slightly elevated. They were also in close apposition with the epithelium, the papillæ being exposed where they were torn loose. The slight congestion accompanying these patches caused a burning sensation. Stopped smoking and applied solution of boric acid for one week, but no improvement: changed treatment to application of tannic glycerate for one week. Condition continued to grow worse. Solution (1:500) of bichloride of mercury was then applied for a few days without any change.

A five per cent solution of argenti nitras was then applied for three weeks. Condition at the end of this time very much worse.

There was now inability to masticate solid food, owing to the excessive soreness of gum and palate. Careful examination revealed the presence of another aphthous patch upon the tongue—making in all three, each as large as a nickel—and a large patch on the gums at either angle of the lower jaw; two small patches on lower lip, and several nodular patches on each cheek.

The secretions of the mouth gave a neutral reaction. Wherever the mucous membrane became abraded the fungus lost no time in attacking and developing upon it—they having the faculty of reproducing themselves upon being detached.

It is no wonder that the mouth should be a favorable location for parasites, when we consider that it is the principal channel through



which food, air and water enter the body, especially when the secretions are abnormal, or there is some gastric disturbance. The normal saliva being virtually a parasiticide, does not allow them to enter unmolested.

Mr. Gruby, in 1852, was the first to show the true nature of this fungus. It being named by him *Aphthaphyte* or *cryptogame du muguet*. It was afterwards called by Robin *Oidium Albicans* and referred to the genus *Oidium*. ("Hist. Nat. des Vig. Parasit," 1853.)

Mr. Clarke says ("Disease of Tongue," page 85, London, 1873) that it forms delicate horizontal filaments, which are apparently homogeneous in structure, and from which short articulated pedicles take their rise. The uppermost cells of these pedicles become expanded into oval bodies which fall off, germinate and become new filaments. "It is generally found growing in tangled masses, like minute bunches of mistletoe, mixed with the debris of scattered spores, cells of lepto-thrix, and epithelial scales."

About September 1 (or five weeks from the time it was first noticed), the treatment having failed to give the least benefit whatever, I decided to resort to some form of treatment that would be more heroic. This was done by applying the solid stick of nitrate of silver every other day, or as often as was necessary, to keep up a continuous sloughing of the mucous membrane, and all parasites that it might reach. Within a week there was a marked change for the better in all patches except those which were nodular and somewhat elevated upon the cheeks. These were removed with the scissors, and their remaining cavities thoroughly cauterized. So far there has been no return of those treated in this way. There have been times when there was not existing any slough, but the surface treated with the caustic was not allowed to become entirely healed.

Improvement has continued until there is now to be seen but two very small patches upon the palate, each near the posterior molar and one at either angle of the jaw. The one upon the apex of the tongue is almost indistinct, not (as might be supposed) due to any application of the stick-caustic, but to coming in contact with the palate after it had been treated with the caustic.

During all of this time the patient has paid strict attention to his diet. He being a physician, could more fully appreciate the importance of what might otherwise be considered valueless in the treatment of such an obstinate disease.—*B. M. Ricketts, M.D.; Cincinnati Lancet-Clinic.*

**INFLAMMATION OF LIPS AND MOUTH ASSOCIATED WITH SKIN DISEASE.**—Mr. Jonathan Hutchinson contributed a paper on a form of inflammation of the lips and mouth, which sometimes ends fatally, and is usually attended by some disease of the skin. The paper contains the description of a disease (not, it is believed, previously recognized) in which superficial ulcerations occur in the lips and in various parts of the mouth, followed sooner or later by some form of skin disease, and tending to a fatal termination. The form of skin disease may vary, but the hands and feet are the parts usually affected, and the nails are especially prone to suffer. In some instances the eruption may consist of bullæ, which are followed by free papillary outgrowths. The patients attacked are usually in middle life, or

in early senile periods. No special antecedents can be alleged as the probable cause of the malady. Unless checked by treatment the disease appears to run its course in about six months, producing death by exhaustion. There seems reason to believe that opium given in repeated doses will cure it, and that there is, at any rate in some cases, no tendency to relapse afterwards. All the best-marked cases as yet observed have occurred in males, but in several milder ones the patients were women. Of the most characteristic, two were master tanners, one was a farmer, one a clergyman, and one a gentleman of no occupation. All these resided in the country. Careful inquiry has failed to support the suspicion that the disease might perhaps be due to contagion from animals.

Of these five cases, two ended fatally and three in recovery. The patients who died were those first observed, and since the discovery of the signal efficacy of opium no case has ended in death. The observation as to the efficacy of opium was simultaneously made by the president of the society, Mr. Pollock, and by the author, two different patients being at the same time under their separate treatment, and recovering under this drug. Since that every case has yielded, if the dose of opium was sufficiently pushed. In one, however, the disease did not yield quickly, and for more than a month seemed likely to end in death. As regards permanency of cure, in one case the patient is known to be quite well four years after his recovery; in another there is reason to believe that such is the fact, and in a third a period of two years has elapsed. In two of the milder cases, occurring in younger patients, the disease has repeatedly relapsed. A great variety of remedies had been tried without benefit before the use of opium was resorted to. In no single case has there appeared to be any tendency to spontaneous improvement. In all the cases the inflammation of the lips and mouth took definite precedence of the skin symptoms, and in some the latter were very slight. It is not known that any case has as yet been obtained amongst the poorer classes of society. The author desired to abstain for the present from expressing any detailed opinion as to the causes or nature of the malady. He would, however, venture to suggest that it is allied to other forms of disturbed health attended by skin disease and occurring in early senile periods, such as certain peculiar varieties of psoriasis, pemphigus, lichen planus, and pityriasis rubra.—*Report Royal Medical and Chirurgical Society, in The Lancet.*

**PYORRHEA ALVEOLARIS.**—Mr. Newland Pedley, F.R.C.S., read a paper at the Odontological Society upon the above subject. Pyorrhea alveolaris is characterized by conditions as follows: The mucous membrane, especially that adjacent to the teeth, is deeply congested, tumid and thickened, and detached from the necks of the teeth and from the roots. A thick fetid discharge may often be pressed up between the teeth and mucous membrane, which gives to the breath a very repulsive odor. Later, the alveoli become absorbed, and at times more or less denuded, whilst the fangs of the teeth become coated with a layer of thin, hard, green-brown tartar. Ultimately, the disease progressing, the teeth, one after another, drop out. The pathological changes which take place are hypertrophy of the

mucopariosteal fold around the teeth, accompanied by dilatation of capillary loops, enlargement of the papillæ, and rapid proliferation of epithelial cells. Later the gum becomes firm and contracted, and displays increase of fibrous tissue. The changes which go on in the socket have not yet been satisfactorily worked out, but the examination of the jaws of some carnivora which were apparently affected with pyorrhea alveolaris would lead to the supposition that there is osteitis of the alveolar process spreading towards the apex of the socket. There are many differences of opinion as to the cause: some maintaining that it is of parasitic origin and due to a specific bacillus, but there is no good proof of this; others that it is catarrhal, and an extension of inflammation of the mucous membrane; others that it is due to the irritation of small deposits of hard tartar under the edge of the gum, but this is plainly not the case, for the disease may be far in advance of the deposit, and in some cases there is not any to be found. It is probably due to some constitutional condition, and the fact that it is often symmetrical, and frequently hereditary, gives support to this view. It occurs in the mouths of patients whose health has been undermined by debilitating influences and injudicious habits of living. It is a common sequel of malarial fever in America. Young persons recovering from eruptive fevers are sometimes subjects of pyorrhea alveolaris; and frequent pregnancies are a fruitful source of the disorder. Attention has been lately drawn to the shedding of the teeth in *tabes dorsalis*, but it does not by any means seem to be a constant symptom. Mr. Bland Sutton has found that premature loss of the teeth is a very common feature in cases of rheumatoid arthritis in animals, and has also met with it in *mollities ossium* and other wasting diseases. Magitot, who views the alveolo-dental periosteum as a ligament, and not of the same nature as osseous periosteum, calls the disease symptomatic alveolo-arthritis, and mentions especially as causes chronic Bright's disease and glycosuria, in which latter, he says, the phenomenon is absolutely constant.—*The Lancet*.

**CUSPID TOOTH REMOVED FROM THE LEFT ORBIT OF A CHILD.**—A well-nourished child, aged 2 years, came under my care in May, 1886, with a hard tumor, about the size of a filbert, firmly fixed just within the left orbit. The tumor could be pressed inwards under the eyeball, and downwards to the edge of the orbital plate. It was deeply imbedded, and required to be carefully dissected out and detached from its connections. The crown of the tooth was inclosed in a sac, and the fang was attached to the orbit-plate by fibro-cartilage. On examination the teeth were found normal in position, complete in number, and well formed; and the jaws were also large and fully developed for a child of 2 years.

Mr. T. J. Tracey and Mr. W. H. Kirton, surgeon-dentist to the Royal Portsmouth Hospital, kindly examined the tooth, and sent me the following report: "This tooth is a well-formed right upper cuspid belonging to the temporary set, and it is a well-developed cuspid for a child 2 years of age."

*Remarks.*—Irregularity in the number of teeth may occur in either the first or second dentition, and supernumerary teeth may spring



up in any part of the dental arch. In shape these teeth are generally irregular and conical, and they bear no special resemblance to any kind of normal teeth; sometimes, however, they present a definite outline, and accurately resemble one of the recognized forms. Instances of supernumerary incisors, cuspids, and bicuspid have been recorded, but examples of ill-shaped teeth, without possessing the characters of any special form, are of frequent occurrence in dental practice. As regards the time of eruption, supernumerary teeth are always irregular. They are generally matured long before the appearance of the permanent set, but their exact relation to the normal teeth is not well defined; they may be freaks of development in connection with either the temporary or permanent teeth. A normal permanent and a supernumerary tooth sometimes seem to hold the same relation to each other as the teeth of the first and second dentition. In my case there was no irregularity of the teeth, but the age of the patient, and also the special characters of the tooth, clearly indicate its relation to the deciduous set.

Cases of misplaced teeth, in strange situations, have often been recorded. These irregularities, however, are not associated with any special shape of jaw, or deficiency of size in the dental arch. The teeth are generally found to occupy an inverted position on the bone to which they are attached. They have been erupted in the hard palate and in the nares, but I have been unable to find an instance on record of a tooth appearing in the orbit. The occurrence of a right upper cuspid in the left orbit is certainly a singular feature in my case, and this crossed displacement must have taken place at a very early stage of embryonic life. The cuspid papillæ appear in the primitive dental groove about the eighth week, and soon after the rudimentary pulp of the milk teeth are in rapid formation within their follicles on the edge of the jaw. At this period a supernumerary follicle and its contents could be very readily displaced from the lip of the primitive groove, as the surrounding tissues are soft, and the rudimentary orbit and the gums are in close proximity. A supernumerary tooth-sac must always be especially liable to dislocation; and when once it gets out of the groove it may be pushed in any direction during the formation of the surrounding structures.—*John Ward Cousins, M.D.Lond., F.R.C.S., in British Medical Journal.*

The following communication relating to the above case appeared in a subsequent number of the *British Medical Journal*:

SIR: The extremely interesting case reported under the above heading by Dr. Ward Cousins, in the *Journal* of April 23, adds yet another to the many instances already recorded of the unexpected trouble sometimes arising from an unerupted, or abnormally erupted, tooth. Permit me, however, to question the correctness of the conclusions arrived at as to the nature of the tooth in point, which is, I think, conclusively proved by Dr. Ward Cousins himself to be a supernumerary tooth, and not one of the normal series at all.

In the report it is stated that, "on examination, the teeth were found normal in position, complete in number, and well formed." Clearly, then, the tooth found in the orbit could not have been a right upper cuspid or any other tooth belonging to the normal milk

series; and it is further stated that "the age of the patient, and also the special characters of the tooth, clearly indicate its relation to the deciduous set." It did not, therefore, belong to the permanent series, and as the milk set was complete without it, there is no option but to decide that the tooth was a supernumerary one belonging to the first dentition. This being so, the question of "crossed displacement" falls to the ground, for there is no evidence that the tooth found in the left orbit ever occupied the right maxilla, and, being a supernumerary tooth, its mere shape would hardly warrant one in definitely fixing the original site of its development.

There is sometimes so great a resemblance between normal and supernumerary teeth that it is difficult to state decidedly into which category a particular specimen should be placed, and this Dr. Ward Cousins has recognized, for he says: "Sometimes they present, however, a definite outline, and accurately resemble one of the recognized forms." The tooth in question should therefore, I think, be described as a supernumerary tooth, resembling a right upper cuspid.

I may add that the statement contained in the latter part of the notice, that misplaced teeth "are generally found to occupy an inverted position on the bone to which they are attached," is one that will scarcely be indorsed by many practitioners.—*Storer Bennett, F.R.C.S.Eng., I.R.C.P.Lond., L.D.S.Eng.*

**DENTIGEROUS CYST.**—Mr. Arthur Baker read a paper on a case of dentigerous cyst occurring in the lower jaw of a boy aged sixteen. The tumor had existed for six months previous to operation. When opened an unerupted cuspid was found at the bottom of the cyst. This tooth showed the malformation known as dilaceration of its root. The importance of diagnosing cases of this disease was shown by the fact that in a similar case, where the cyst was not recognized, one-half of the jaw had been excised.

Mr. Story asked Mr. Baker if he thought dilaceration of the tooth sufficient to account for the cyst. He stated that there was only one other case on record in which a dilacerated tooth was found occupying the cavity of one of those so-called dentigerous cysts. He (Mr. Story) was of opinion that most of the cases of this sort did not come before the dentist at all, but were seen in hospitals by gentlemen practicing surgery.

Dr. MacSwiney said cases of teething were sometimes met with in children where it seemed impossible for the unaided powers of the child to erupt the tooth, and on such occasions he had seen a soft, tumid condition over the tooth, which had not escaped through the gum, and which when incised with a gum-lancet had given exit to a clear, viscid fluid. There was in such cases a sort of cyst under the unbroken gum and resting on the crown of the tooth. Was there any connection between those cysts of early primary dentition and the formation of such a cyst as Mr. Baker had described?

Dr. Corley remarked that the case was an important one for the consideration of all surgeons who were contemplating the capital operation of excision of the lower jaw.

Mr. Baker (in reply) said he did not think the exact cause of such cysts as he had described was known. In the present case the dilaceration was a factor which prevented the eruption of the tooth

at the proper time by twisting it out of its proper course. The cysts mentioned by Dr. MacSwiney as occurring over the milk-teeth of children were pretty well recognized as of frequent occurrence, and it was undoubtedly a normal condition that a small quantity of fluid should collect between the enamel and the follicle.—*Med. Press.*

THE PROPHYLAXIS OF THE TEETH.—Miller, of Berlin, in an article upon the care of the teeth, published in the *Therapeutische Monatsheft* for March, 1887, gives the following as useful formulæ:

R.—Calcii carbon. præcip.	33.
Cort. chin fusc.	15.
Conch. præparat.	15.
Pulv. myrrh.	7½.
Pulv. carophyll.	33.
Ol. cinnamoni.	gtt. 10-15.
M. exact. f. pulv.	

The following is recommended as an efficient tooth-soap:

R.—Magnesiæ carbon.,	
Rhiz. irid. florent.,	
Talci,	
Sapo. medicat.	āā grs. 75.
Ol. menth. pip.	gtt. 10.
Mucilag. gum arab.	q. s.

After a series of experiments the writer has fixed upon the following mouth-wash as the best germicide and antiseptic for use in the mouth:

R—Acid. thymic . . . . .	grs. 4.
Acid. benzoic . . . . .	grs. 45.
Tinct. eucalypt. . . . .	33.
Alcohol absol. . . . .	25.
Ol. gaultheriæ . . . . .	gtt. 25.
(Sine ol. menth. pip. . . . .	gtt. 20).
M. D. S.	

Of this liquid a teaspoonful should be put in a glass of water, and the mouth should be rinsed after each meal, and before retiring.—*Cincinnati Lancet-Clinic.*

THE CONTROL OF HEMORRHAGE.—Dr. A. Maguire thus writes in the *New Orleans Medical and Surgical Journal*:

"In ante-bellum days I was called to a large plantation in my neighborhood by the manager, one of the old-time overseers, who had great confidence in his powers of healing, and was convinced of his superiority over any new-fledged Æsculapius, and that what he did not know of medicine was not worth knowing.

"He pointed to a ghastly-looking African sitting on a veranda, with his head leaning against the brick pillar, blanched as much as his color allowed, and with a small stream of blood and saliva trickling from one corner of his mouth. He had extracted, twenty-four hours before, the third molar, and the blood had never stopped. He had applied strong vinegar, Parvaz's perchloride of iron, nitrate of silver, and had caused the blacksmith of the plantation to bend and file down to a point a goodly-sized wire with which he had cauterized the socket. After doing all this he confessed he was at his wit's end. After reviving the drooping African with a square dose of whisky, I made a wad of cotton to be compressed



between his jaws, leaving a piece protruding in the mouth of sufficient size to allow the involuntary play and suction of the tongue to be exerted on it, and not disturb the formation of the clot in the socket. The hemorrhage was arrested in ten minutes."—*Pacific Record*.

**EPILEPSY FROM CARIOUS TEETH.**—Dr. Liebert reports three cases of epilepsy (one in its initiatory stage), which all showed a marked aura, one beginning with a cramp or involuntary motions of the tongue. All three cases were promptly and permanently cured by the extraction of a decayed tooth, which in every instance had been the source of irritation.—*Medical Register*.

**ANODYNE FOR ODONTALGIA.**—The following mixture is recommended :

R.—Camphor	5 parts.
Chloral hydrate	5 parts.
Cocaine hydrochlorate	1 part.

On heating this mixture to the boiling point of water an oily liquid is formed, which is to be applied lightly.—*Physician and Surgeon*.

#### ANTISEPTIC MOUTH-WASH.—

R.—Sodæ biboratis	1 part.
Thymol	$\frac{1}{2}$ part.
Aqua destil.	300 parts.
Ft. sol.	

This preparation is said to be an excellent corrective for fetid breath, when it proceeds from decaying matter in carious teeth, etc.—*Magitot, in Gazette Hebdomadaire, Med. and Surg. Reporter*.

**ANTISEPTIC TOOTH-POWDER.**—The following formula for a tooth-powder for special cases is recommended by Dr. MacGregor :

Boric acid, finely powdered	40 grains.
Chlorate of potassium	$\frac{1}{2}$ drachm.
Powdered guaiacum	20 grains.
Prepared chalk	1 drachm.
Powdered carbonate of magnesia	1 ounce.
Attar of roses	$\frac{1}{2}$ drop.

M.

This should be used every morning and after each meal, if possible.—*Druggists' Circular*.

**MEDICAL MEN AND DENTISTS.**—The question has recently been raised by a correspondent of the *Journal of the British Dental Association* as to the scale of fees to be charged by medical men to dentists and their families. We do not remember to have seen the question formally put before, but now that this has been done we do not hesitate to express an opinion that dentists ought to be considered more or less in the light of brother practitioners. Their conduct towards medical men who are in need of their services is almost invariably characterized by courtesy and consideration, and the opportunity to reciprocate is one which should be seized with *empressement*. The status of dentists has made vast progress during the past few years, and their social position is now more in accordance with the highly-skilled services which they render to a suffering public. Dentistry is, properly speaking, but a department of surgery, and by no means the least useful. Dentists do more for our comfort and health than do many more purely surgical operations, and they do it moreover with an ease and a certainty which the others have yet to attain.—*Medical Press*.

**NECROSIS OF JAW FROM ADMINISTRATION OF PHOSPHORUS.**—Necrosis of the lower jaw, due to the fumes of phosphorus, is unfortunately of sufficiently frequent occurrence to be scarcely worthy of note; but the following case, reported by Mr. Hutchinson, at the Clinical Society of London, possesses features worthy of mention. The patient, a lady of 45, after taking pills containing 1.33 grain of phosphorus three times daily for two years, consulted Mr. H. for necrosis. In this case, as in all others on record, carious teeth were found to exist.—*Pacific Record*.

**BRIDGE-WORK FLUX.**—A flux that is exceedingly useful in bridge-work is prepared as follows. Put in a cup:

Boracic acid . . . . .	1 oz.
Ammonia . . . . .	$\frac{1}{2}$ oz.
Carbonate of ammonia . . . . .	$\frac{1}{2}$ dwt.
Bicarbonate of soda . . . . .	2 dwt.
Water . . . . .	4 ozs.

Boil until the fumes of ammonia are no longer given off. Coat the bridge or other work all over the gold with the flux. Heat it over a spirit-lamp to dry it on. Give it another coat, if needed, leaving no part exposed. Then scrape off where it is desired that the solder shall flow, and it will go nowhere else. The work will come out of the heating as bright as when it went in, and the solder will be smooth. The polished surfaces will not be corroded or blackened.—*H. W. Howe, D.D.S., in Independent Practitioner*.

## HINTS AND QUERIES.

I WOULD like the ideas of different dentists in regard to taking impressions for upper full sets where the gum in front is soft and flabby, with hardly more firmness than the lip itself; whether plaster, wax, or modelling composition is best, and if used thinner and softer than usual. Also, treatment of model.—*A. A. H.*

**THE BING BRIDGE.**—As early as 1869 Dr. Bing, of Paris, France, originated the idea of employing the natural teeth on either side of a dental vacancy as abutments for a prosthetic bridge, firmly and permanently fixed to those teeth, and carrying an imitation tooth or teeth which, while conforming nearly to the process vacated by the removed tooth, was yet kept from resting upon the gum and was wholly supported by the abutting teeth.

This invention embodied the first and fundamental idea of the modern permanent bridge denture, of which subsequent forms of practical bridge-work are mere modifications. Recently a porcelain tooth-crown has been made having two stout pins of platinum baked in each side of the crown (see Fig. 1), the pairs of

FIG. 1.



pins being so placed that the tooth when fixed will be held in proper relations to the adjacent teeth. Fig. 2 shows these abutment teeth prepared to receive a lateral-incisor Bing-bridge crown; and Fig. 3 is a face view of the same in position. A like example of a bicuspid bridge is illustrated in the preparatory stage by Fig. 4, and as completed in Fig. 5.

These Bing crowns may be soldered to each other, or to collars and to cap-crowns, in the construction of every form of bridge denture now known to th-

dental profession, as well as of some forms which are not yet well known, because they are still in various stages of experimental development; but without waiting

FIG. 2.

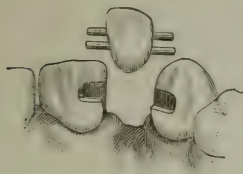


FIG. 3.

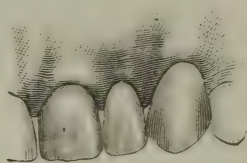


FIG. 4.

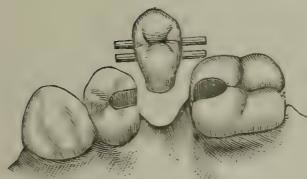
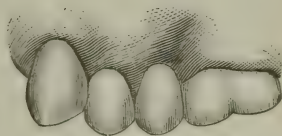


FIG. 5.



for these to be brought forward, attention is directed to the Bing-bridge crowns as adapted to the present wants of many enterprising members of the profession.—E. T. S.

**IMPLANTATION.**—This operation is becoming more and more popular for certain cases, as the success of practical cases is established. It should be performed with as little pain and inconvenience to the patient as is feasible. The instruments now on the market for this purpose, while very useful and practicable, are in some cases not wholly satisfactory. The spiral crib knife, which I have devised, obviates many of the objections that can be raised against other instruments; it virtually combines the advantageous points of Dr. Walker, Dr. Younger, and Dr. Rollins's instruments. While cutting the bone rapidly, the blades of the knife are readily self-cleansing, and thus prevent clogging by the soft, pulpy bone-mass. Anyone who performs the operation of implantation should be provided with the best and most improved instruments for this purpose. The instrument is shown in two sizes by the accompanying illustration.—LOUIS OTTOFF, D.D.S., Chicago, Ill.



**PURE MERCURY.**—In making a dental amalgam, use always pure mercury, bought from a trustworthy dealer, who knows that the article is pure. The use of impure mercury must make a poor amalgam with the very best alloy that can be obtained. Keep the mercury constantly covered with alcohol, which should remain clear, and the surface of the mercury appear brilliantly bright. Take a common glass drop-tube with bulb; compress the bulb; pass the glass nozzle through the alcohol into the mercury; release the pressure on the bulb, and the tube will fill with mercury, which may then be dropped into the hand or mortar in as small a quantity as is desired. By this method the mercury in the tube and bottle is kept from contact with the air, and will remain bright and clean until the last. If through neglect the mercury should become oxidized, wash it by shaking it in the bottle with alcohol renewed again and again until perfectly free from discoloration by the mercury. The disesteem in which amalgams are held



by many dentists and patients may be in great measure chargeable to the use of impure mercury. Every dentist experienced in the construction of silver plates knows the importance of making his solder bright and clean. Similar conditions should for like reasons be observed in making a dental amalgam with mercury, which ought not only to be pure and kept clean, but for the production of the best results it ought never to be mixed with the alloy in the hand, because of the inevitable film of dermal secretions that will be spread over the surface of the mercury, and by so much hinder the perfect union of the metals. The mix ought therefore to be made in a clean rubber or vitrified mortar with a rubber or glass pestle, and the pellet compressed in a piece of washed and dried buckskin. If with these precautions care is taken to keep the alloy in a tight-stoppered bottle, amalgam fillings of unwonted excellence may be made.—W. S. H.

**NECROSIS OF THE ANGLE OF THE INFERIOR MAXILLA.**—About a month ago we were called to attend the wife of a prominent physician of this city. She was suffering from severe pains in the lower jaw in the vicinity of the first and second molars on the left side. The first molar was found in a badly decayed condition, and was at once extracted. Her sufferings continued after the operation, and a few days later it was decided to remove also the second molar, which was slightly affected with caries and gave great pain when touched. The patient still obtained no considerable relief, and there shortly occurred a discharge of pus from the alveoli of the extracted teeth, the soft tissues being very much inflamed. A mixture of glycerin  $\mathfrak{z}$ j, carbolic acid gtt. v, was ordered to be applied on pledgets of cotton three times daily. Aromatic sulphuric acid, diluted with three parts of water, was likewise employed, and the tooth-sockets syringed with a weak solution of permanganate of potassa. At the end of six or eight days we were able to make an examination that disclosed a necrosed condition of the bone extending nearly to its angle. Dr. Vaquier, a French physician of eminence, was called in consultation, our diagnosis corroborated, and after placing the patient under the influence of chloroform, the soft parts were raised in flaps and the necrosed portions thoroughly removed with dental-engine saws and burs, the débris being completely washed away by the use of the syringe charged with a solution consisting of boracic acid grs. x, pulv. borax grs. xx, and aqua pura  $\mathfrak{z}$ jss. This solution was prescribed for hourly use as a gargle, and without further treatment the patient made a rapid and complete recovery.—SPYER & CORNISH, City of Mexico, July 6, 1887.

**MISSIONARY DENTISTS.**—The favorable reception of missionaries of the Gospel among heathen nations has of late years been greatly promoted by sending as heralds regular graduates of medicine, who, by the exercise of their skill in the healing art, have won the confidence and esteem of most barbarous and blood-thirsty tribes. The practice of dentistry is likewise proving a means for peacefully introducing the missionary into the good graces of suffering savages, and in a recent tour of the island of Formosa it was a not infrequent preliminary to religious services for the missionary to extract fifty or more teeth. The radical relief of toothache, by simple and obvious means, may well excite heartfelt gratitude in the sufferer, and engender such confidence in the friendly disposition of the dentist that easy access will be gained for the faithful ministration of the Gospel teacher. The attention of the various missionary boards might be profitably directed to the obvious advantages of having more of their messengers duly qualified and equipped for the gratuitous practice of dental surgery among the heathen.—H.

T H E

# D E N T A L   C O S M O S.

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No. 9.

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## ORIGINAL COMMUNICATIONS.

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### THE NEAR APPROACH, EXPOSURE, AND DEVITALIZATION OF THE DENTAL PULP.

BY WILLIAM H. TRUEMAN, D.D.S., PHILADELPHIA, PA.

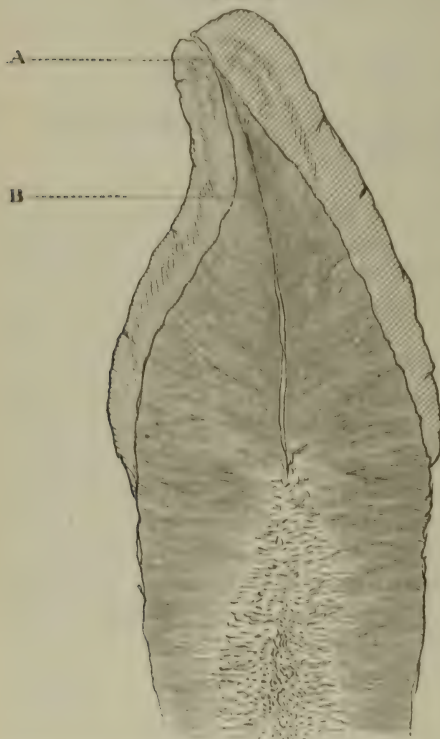
(Read before the Pittsburg Dental Association, July 14, 1887.)

THE title selected suggests the progressive stages of pulp-complication met with in the operations usually performed for the arrest of dental caries and restoring to usefulness the affected teeth.

All cavities of decay are not equally sensitive; nor is the sensation proportionate to the depth to which they penetrate the substance of the teeth, nor yet to the nearness with which they approach the organ generally recognized as the center of sensation—the dental pulp. This fact renders necessary a nice discrimination to diagnose between the near approach of a vital pulp and a condition which will frequently, during the preparation of a cavity, cause exquisite pain, by the patient hardly distinguishable from that caused by exposure of the pulp. This is known as sensitive dentine. The depth of the cavity, if but slight, or its position such that we may reasonably expect there exists considerable substance between it and the pulp-chamber, is quite suggestive, but not absolute proof that the central organ is not directly implicated. We must ever bear in mind the larger proportional size of the pulp in early life, the possibility of its occupying an abnormal position, and also that there may exist a prolongation of pulp-tissue extending toward the periphery of the tooth far beyond the usual boundaries of that organ. There is also another condition, more frequently met with in early life and in teeth of defective structure, that merits consideration. Without entering into the details of tooth-development, and perhaps, if we accept the teachings of the later investigations, sacrificing to some extent scientific accuracy, we may suggest that during that stage of development generally understood by calcification it is quite possible that certain portions of the tooth, usually somewhat limited in ex-

tent, and in line with the dentinal tubuli, are not so fully changed in character as is the surrounding tissue. Dr. J. D. White, of Philadelphia, called attention to a condition nearly analogous to this in an article published in the *Dental News Letter* for April, 1857 (Vol. X, page 197), upon "Tooth Edge," in which he refers to the peculiar sensation known as the tooth being "on edge," produced by harsh, scraping sounds, or by the use of acid fruit, etc. He suggested speaking especially of the incisors, and while doing so referred more

FIG. 1.



to a clinical fact he had noticed than to the process of tooth development; calling attention to the line usually seen extending longitudinally and about the middle of its thickness upon the cutting edge of the anterior teeth after they have become somewhat worn—that "they present the appearance of being composed of an anterior and posterior plate, or of two halves, like an oyster shell, the line of juncture being more or less open, according to the character of the tooth. Hence, in looking at the cutting-edge of a tooth, a faint line can be seen as soon as it erupts from the gum, as though it were a crack running from one side of the tooth to the other, which becomes more distinct as the

tooth is exposed to friction. The accompanying drawing (Fig. 1) will show the seam\* (A) through the enamel, and also the seam (B) continuing through the body of the tooth as far down as opposite to the neck. This section has been made longitudinally through a front tooth in an antero-posterior direction, and outside of the pulp-cavity, to show that it is through the whole body of the tooth, as far down as the neck or gum, and not merely in front of the pulp-cavity; but it is more open opposite to the cavity." He relates several in-

\* This seam is not an open space; it is filled with connective or uncalcified tissue.



stances of extreme sensitiveness along this line, in teeth otherwise sound. He ascribes this to a line of imperfectly calcified tissue which for convenience he terms "pith."

In excavating cavities upon the approximal surfaces of incisors, I have frequently met with a line of exquisitely sensitive tissue occupying the position indicated by Dr. J. D. White, the tissue on either side not partaking of this peculiarity. In a notable number of such cases I have had the pulp to die within a few years after the operation has been performed. In most cases, except for a few days immediately following the operation, the patient has not suffered pain at any time, nor have the teeth at any time been unduly intolerant of thermal changes. In several cases I now remember, the operations were trifling in character, the subsequent operation for the removal of the devitalized pulp showing sufficient apparently sound tissue to have fully protected the pulp. Of course it is possible that the death of the pulp may have been caused by violence, a blow, biting threads, an accident during mastication, etc., that at the time attracted but little attention, and was afterward quite forgotten. It may also have resulted from a cold, deranged health, or other like cause,—but since noticing this and adopting in such cases the practice of protecting this sensitive tissue with a rigid cement, generally zinc oxychloride, death of the pulp has occurred far less frequently. The decay occasionally met with on the cutting edges of incisors, penetrating deeply into their substance, but unless long neglected confined to a narrow line parallel with the cutting edge of the tooth, is another evidence of the possible existence of congenital defects such as Dr. White refers to. Similar defects, perhaps less frequently, but quite as marked, are also found in connection with buccal cavities upon the molars, and in fissure cavities of the molars and bicuspid.

Between this condition and sensitive dentine the difference is quite marked. Sensitive dentine responds to the cutting tool over a considerable area of the cavity walls; is not responsive to simple pressure; seldom, indeed, gives rise to pulp-complication. The defective tissue referred to responds quite as acutely to pressure as to the cutting tool; is confined so completely to a single point or a narrow line that it usually suggests to the operator and patient pulp-exposure; and unless carefully protected is as intolerant of the presence of the filling as is the pulp itself.

In treating cavities that penetrate deeply into the dental structure,—more so than do those which we have just considered,—the necessity of caution becomes imperative and the danger of unduly encroaching upon pulp territory rapidly increases. The molar and bicuspid sectionally shown photographed in Figs. 2 and 5 illustrate

abnormal positions of the pulp more frequently found in early life. In the molar we notice, at *a*, a cornu or prolongation of pulp-tissue extending far beyond the usual boundaries of that organ. This tooth has an extensive crown cavity. The deeper portion, however, is occupied by dentine which, although so changed by decay that while it would be unwise to allow any portion to remain if situated near the orifice of the cavity, or directly in the track of possible recurring decay, in this instance may and should be allowed to remain. To remove it would probably expose the abnormally placed portion of the pulp; or were this avoided and by skillful and careful excavating no portion of the exceedingly thin covering of doubtful dentine were punctured, it would expose so large a surface of the pulp to the near presence of the filling that it is extremely doubtful if it would long survive,—if, indeed, it is not now so affected by the near approach of decay that its devitalization is an assured fact under any circumstances. The bicuspid (Fig. 5), to which I

FIG. 2.



FIG. 3.



FIG. 4.



FIG. 2. Section of a molar, showing at *a* an extension of the pulp.

FIG. 3. Section of a lateral, with caries on either side, but not exposing the pulp.

FIG. 4. Section of a cuspid, with caries on either side, but not exposing the pulp.

shall again refer, is perfectly sound, and has seen many years of service. Its history is unknown. The crown portion of the tooth is markedly wedge-shaped, the roots quite cylindrical and united nearly to their apex by a thin wall (or web) of dentine. The marked contraction at the neck is shown more clearly by Fig. 6, a section from

a bicuspid similarly shaped. The pulp as it enters the crown is deflected to one side, and is so situated that a comparatively slight cavity upon one portion of the crown or upon the approximal surface towards which the pulp presents would inevitably expose it. I have no doubt that this tooth was lost owing to the abnormal position of its pulp.

These two illustrations may be taken as types of a condition which, however rare, is likely to be met with at any time. The fact that it is comparatively rare gives to it greater importance. Notable sensitiveness confined to one portion of the cavity walls will always suggest the possible existence of some such abnormal condition. In treating such cases, I prefer to first flood the cavity with creasote, allowing it to remain a few minutes, and then fill the whole or a portion of it with a zinc cement, preferably the oxy-chloride. The pain attending its introduction is very much moderated by first placing in the cavity a portion of the dry powder. Quite frequently after such a filling has remained for from six

months to a year, the sensitiveness will have disappeared. I prefer, in refilling, whenever possible, to not disturb the portion covering the sensitive tissues, but to prepare and permanently fill the cavity without removing it.

The near approach to and actual exposure of the dental pulp involve conditions so nearly similar that I propose to consider them together, and in doing so will deal more largely with the question of devitalization and conservation than the means by which either end is attained. In either case, the possibility or the probability of inserting the filling without exciting serious irritation of this important organ has not seemed to me to be the most important question. With ordinary care and the aid of appliances now in general use, that is readily accomplished in most cases. The real question has seemed to be, Can we by so doing secure the best result?

The relative value of a vital and a devitalized tooth I do not question. Other things being equal, notwithstanding the greater success now possible in treating devitalized teeth, the greater value of a tooth normal in its relations to the general system over one whose relation is so greatly disturbed as is a tooth from which the pulp has been removed I do not consider a debatable question. In this as in many surgical and dental operations we must compromise between possibilities and practicabilities, and adopt that course which promises the greater usefulness.

In cases where the cavity is favorably situated, and we can feel assured that the pulp has suffered no serious injury from the near presence of the decay, or from the pathological conditions associated with it, to devitalize is criminal. On the other hand, where the cavity is difficult of access, or where we have reason to doubt the actual condition of the pulp, I do not think we are justified in otherwise treating it. Apart from the condition of the tooth, however, are many considerations which are to be borne in mind. The best treatment for a patient always accessible may be the worst for one who may soon remove beyond the reach of skilled dental assistance. The condition of the health and of the teeth, the circumstances and surroundings of the patient, are factors always to be considered. The lateral and cuspid illustrated in Figs. 3 and 4, are cases where it would be quite possible, with ordinary precautions, to fill the cavities on either approximal surface without devitalizing the pulp, and yet it would be very questionable practice. Both are teeth that have been long neglected; the most carefully devised plan of treatment that could be adopted necessarily brings into near proximity of the pulp, already pathologically disposed, a large surface of foreign matter more or less irritating. If a metallic filling is inserted, thermal changes may prove the disturbing influence; if to prevent



this gutta-percha is first introduced, the pressure of its application, or pressure that may be exerted after the operation is complete, caused by changes in its form or volume, may be equally destructive. Any cement at present known, however bland, applied to a surface so porous as is the dentine in the immediate proximity of the pulp, may, without being itself irritative, prove a decided irritation. In all such cases, where it is thought best to attempt the preservation of the pulp, I would strongly advise the use of plastic fillings for the first four or five years, renewing as frequently as may be needed; bearing in mind, however, that even after the lapse of that period the entire removal of the filling and its replacement makes the life of the pulp as uncertain as it was at first. When filling permanently, therefore, remove sufficient only to insure firm retention of the outer portion.

Magitot, in his treatise on dental caries ("Treatise on Dental Caries," by Dr. E. Magitot; translated by Thomas H. Chandler, D.M.D.; Boston, 1878), describes and beautifully illustrates the progress of decay and the manner in which it causes pulp-complications. We have copied and here insert the plate\* showing the changes produced, first in the dentine, and finally in the pulp, by the progressive approach of caries. A little practical experience in making and microscopically examining sections of teeth affected by caries will demonstrate that these drawings are from nature, and that the appearances there illustrated actually exist. In all cases nature makes a more or less pronounced effort to resist the progress of

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\* EXPLANATION OF PLATE.

FIG. 1. Vertical section of a lower molar from a person twenty-five years old. Magnified five diameters. *a, a*, enamel; *b*, ivory; *c*, cavity of pulp; *d, d, d*, congenital fissures in the enamel in which caries has begun; *e, e, e*, first sketch of the white zone, or cone of resistance, produced by obliteration of the canalicules.

FIG. 2. Vertical section of a lower first molar from a person twenty years old. Magnified five diameters. *a*, enamel; *b*, ivory; *c*, pulp-cavity; *d*, furrow in the enamel where caries has begun; *e*, beginning of the invasion of the ivory by caries, surrounded by an isolating line.

FIG. 3. Vertical section of the crown of the first adult molar. Magnified five diameters. *a*, enamel; *b*, ivory; *c*, cavity of the pulp; *d*, nearly cylindrical caries of the enamel, with a minute persistent ridge in the center; *e*, resistant cone not quite arrived at the pulp-cavity.

FIG. 4. Vertical section of the crown of an upper second molar from a person of about twenty years. Magnified five diameters. *a*, enamel; *b*, ivory; *c*, cavity of the pulp; *d*, vast hollow in the trituran face; *e*, cone of resistance reaching the cavity of the pulp over a considerable surface, but without presenting any other appearance of secondary dentine.

FIG. 5. Vertical section of an upper first molar. Magnified five diameters. *a*, enamel; *b*, ivory; *c*, cavity of the pulp; *d*, superficial caries of the enamel; *e, e*, cone of resistance not yet reaching the external surface, but reaching the pulp-cavity.

FIG. 6. Vertical section of the crown of an adult upper bicuspid. Magnified five diameters. *a*, enamel; *b*, ivory; *c*, cavity of the pulp; *d*, lateral cavity that has entirely destroyed the enamel layer and invaded the cone of resistance. The tip of this cone at the pulp-cavity presents at *e*, a rounded prominence formed of secondary dentine, with proportionate retreat of the pulp.

FIG. 7. Vertical section of the crown of an upper bicuspid. Magnified five diameters. *a*, enamel; *b*, ivory; *c*, cavity of the pulp; *d*, lateral caries which has invaded the ivory and reached the cone of resistance; *e*, minute portion of secondary dentine formed by the pulp and projecting into its cavity.

—*Journ. d' Anat. et de Physiol.*

PLATE.

Fig. 1  
5/1

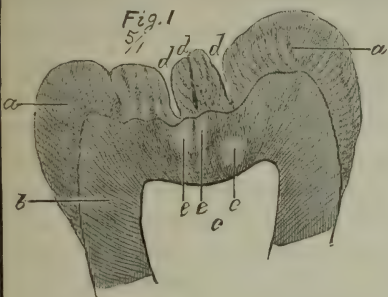


Fig. 2  
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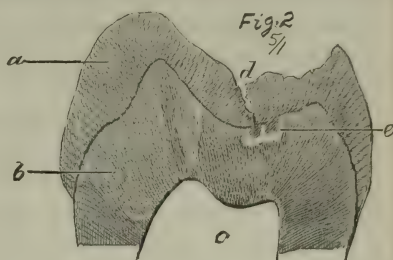


Fig. 3.  
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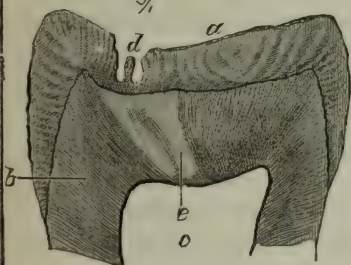


Fig. 4.  
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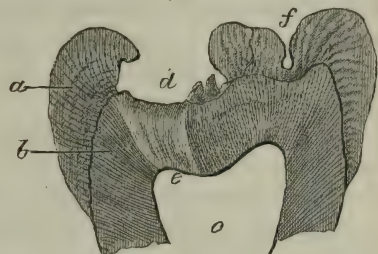


Fig. 6.  
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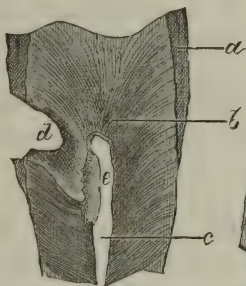


Fig. 7.  
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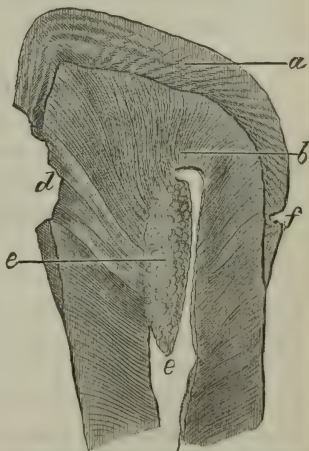
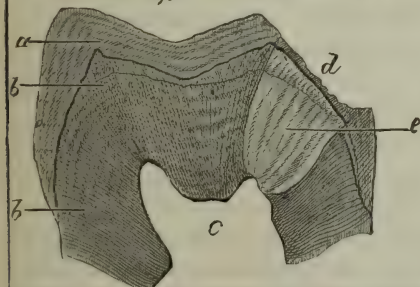


Fig. 5.  
5/1



caries. This is first seen as a white transparent zone in the dentine beneath the altered portion of the enamel layer, and is well shown in its earlier stage immediately beneath the fissure cavity in Fig. 1, Plate. This zone has a nearly constant form,—that of a cone with its base turned out to the exterior of the tooth, its point or summit turned toward the pulp. As decay progresses this cone of resistance becomes more and more pronounced; it quickly reaches the pulp, where quite frequently as seen in Fig. 6, Plate, there is produced a prominence of secondary dentine impinging upon the pulp. This cavity has not as yet exposed the pulp; indeed, it is not seemingly dangerously near; and yet, is it possible that it can have produced so marked an effect upon that organ without seriously endangering its existence? In Fig. 7, Plate, the effect of approaching decay upon the pulp is shown in a much more marked degree. I present this as one of the unseen, unknown, and unknowable risks always attending the treatment of deep-seated decay, and hope that the examination of these drawings will induce you to obtain and carefully read the volume from which they have been copied. You will find it a readable and instructive book.

We have now briefly considered three conditions of common occurrence complicating pulp conservation,—namely, congenital structural defects of the dentine, abnormal positions of the pulp, and irritation of the pulp due to the presence of decay. The existence of these conditions, either one of which is equally liable to bring to nought the best efforts of a skilled and careful operator, or how much or how little they may have compromised the well-being of the pulp, it is exceedingly difficult to foresee. An educated judgment and constant watchfulness may lessen the risk; delicate manipulation and carefully applied means may accomplish wonders; but cannot eliminate from the operation known as “pulp-capping” the uncertainty that does now and perhaps ever will attend it.

I will now consider those cases where, in deciding whether to devitalize or to protect the pulp, the permanency and usefulness of the filling are the more immediate cause of concern. In preparing a cavity the first and most important consideration is to secure sound and uninjured tooth-structure for those portions of its walls approaching, and especially that portion forming its immediate orifice, or the exposed line of juncture between the tooth-structure and the substance of the filling. The ease or difficulty of securing this, so far as a vital pulp affects it, depends very largely upon the position of the cavity. The maximum of difficulty is reached, perhaps, in approximal cavities of the posterior teeth, especially those which extend beneath the gum-margin. In this position the sense of touch is less able to distinguish softened dentine from the normal tooth-



tissue found at this point; it is less accessible to sight; these and the increased sensitiveness of the tissues, the fear of accidental exposure of the pulp, or where this exists, the fear of accidental injury to that organ, may, by exciting excessive caution, cause a careful operator to overlook a portion of defective tissue, and thus invite recurrence of decay. This may be avoided, and the exposed portion of the filling be in contact at all points with sound, healthy tissue. The pulp may have escaped the slightest injury, and yet in a bicuspid shaped like that shown by Fig. 5, how little margin there is between the pulp and the outer boundary of the neck of the tooth on which to anchor the cervical portion of the filling is shown by section, Fig. 6; how very little, indeed, if it is found necessary to place a heat non-conductor or a pulp-capping between the filling and the pulp. Where the size and shape of the tooth are normal, as shown in Figs. 7 and 8, this is far more practicable; but experience demonstrates that failure in these cases is of common occurrence.

In all such cases, unless the cavity is so shielded that a gutta-percha filling will endure a reasonable time, I would much prefer to devitalize; feeling that the greater security of the filling fully compensates for the injury thereby done to the tooth. I do not forget that a filling may often be securely retained without depending to any great degree upon the cervical margin; neither do I forget how quickly an unobserved recurring decay at this point may bring about devitalization of the pulp with infinitely greater injury to the tooth than if it had been done before the filling was inserted.

Crown cavities are so accessible, and recurring decay, where the filling has been inserted with even moderate care and skill so infrequent, and so readily and quickly detected, that I do not at this time refer to them. Neither do I refer to cavities in other positions nearly equally accessible, and in other respects but little less favorable to permanently successful results. The point I wish to make and strongly impress is this; that in considering the advisability of conservative pulp-treatment, the position of the cavity is a matter of quite as much importance as are the pathological conditions involved; and furthermore, that a successful pulp-capping does not always prove a successful tooth-saving operation. All methods we have seen recommended for pulp-protecting or pulp-capping, in cases of near approach or of actual exposure, necessitate and consist in

FIG. 5. FIG. 6. FIG. 7 FIG. 8.

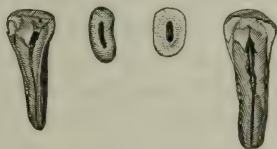


FIG. 5. Section of a bicuspid abnormal in shape, the pulp occupying an abnormal position.

FIG. 6. Section of same near gum line.

FIGS. 7 and 8. Sections of a bicuspid normal in shape and size.

filling that portion of the cavity approaching most nearly the pulp with a material that is of but little use of itself and independent of the protection afforded it by the outer and larger portion of the filling, in resisting the destructive agents which have caused the decay. If from any cause the capping is deprived of the protection afforded by the filling it is quickly washed away, and at once ceases to protect from recurring decay that portion of the cavity it occupied. Take, for instance, an approximal cavity in a bicuspid where pulp-exposure exists; suppose it is capped with a paste of zinc-oxide and creasote; this in turn is held in position by a zinc cement, either oxychloride or phosphate. This cement is mixed quite thin so as to be floated over the protecting film of zinc-oxide and creasote without disturbing it: it is then allowed to harden before the gold, amalgam, or other filling-material used to complete the filling is inserted. How long would the zinc cement thus mixed and applied prove a reliable filling, if fully exposed to the secretions of the mouth? How long would it last if, from any cause—recurring decay, for instance—it became exposed after the lapse of a year or two to these same destructive agents?

The slightest injury to the cervical border, if it reaches this non-resistant pulp-capping, as fully opens and as fully exposes the tooth to decay as it was before the filling was inserted; that, too, under conditions far more favorable to its rapid progress. It may be said that the pain attending the re-exposure of the pulp would immediately call attention to it. This, however, in practice, is rarely the case. The point of exposure is protected by the filling equally well from thermal changes and from pressure, and under such conditions a large exposure may exist without attracting the patient's attention. In patients who are regular in attendance it may soon be discovered; not, however, before devitalization becomes inevitable. In other cases alveolar abscess is usually the first indication of impending trouble.

In conclusion, I do not wish this paper to be considered as a plea for pulp-destruction. Conservation of the dental pulp has of late occupied so large a share of attention, and has proved so much more successful than was anticipated, that many have come to consider it the only correct practice. Most writers upon the subject, in my judgment, err in considering it from a pathological stand-point only; as before remarked, there are other considerations, to my mind equally important. Daily practice has demonstrated that by far the larger percentage of failures have been in cases where from other than purely pathological reasons conservation should never have been attempted. I am thoroughly convinced that any operator's success in pulp-conservation will depend very much upon his judgment in selecting cases; and his success in treating all conditions involving the pulp will depend far more upon his care and skill than the method he adopts.

I have endeavored in this paper to call attention to matters not usually considered, and to keep as far as possible from the well-trodden path. Before closing I desire to call your attention to the useful properties in this connection of the cement known as Sullivan's amalgam, a compound consisting of copper and mercury only. It has been used with satisfaction for many years in England and other parts of Europe; but here, until recently, has been almost unknown. It is made by uniting finely-divided copper with mercury. The various methods by which this may be accomplished are referred to in most of the larger chemical works. Where it can be obtained ready prepared it is far better to do so, as the process of making it is somewhat tedious, and the free use of mercury during its preparation is quite objectionable; especially if it becomes scattered in a finely-divided state upon the work-bench. The method that has so far given me the best results is as follows:

First, make a dilute solution of copper-sulphate,—say two ounces to a gallon of water. Into this place a piece of sheet iron presenting a large surface. If the solution is at all concentrated, or the surface of iron small, the copper is precipitated in a granular form, quite useless for our purpose. In the course of a few days all the copper is thrown down as a fine flocculent precipitate. This is now well washed in hot water, and is twice during the process boiled in hydrochloric acid to remove all traces of iron. The washing is continued until the water poured off shows by chemical test that no iron is present. Sheet-zinc may be used to precipitate the copper, but it is not advisable to do so, as it is quite difficult to free the precipitate from zinc; and a trace of zinc will prevent the amalgam hardening. There is on the market a preparation of finely-pulverized pure copper that answers nicely for making the amalgam and saves a great deal of trouble, provided it is pure. Some I have met with is in the form of a coarse powder, and evidently contains zinc or other impurities which prevent its becoming hard when formed into amalgam. We now proceed to add the mercury. Roughly, copper combines with about three times its weight of mercury. I have found, however, that in making the amalgam the mercury must be used much more freely,—probably twice this amount being required,—the excess being afterwards removed by pressure. First, dissolve a small quantity of mercury in cold dilute nitric acid, completely saturating the acid. This is added to the wet precipitate of copper contained in a bowl shaped like a mortar, capable of bearing without injury hot water, and stirred up with a glass rod. When this is thoroughly mixed the remainder of the mercury is added. This is now thoroughly triturated until the mass becomes plastic and uniform. During this process a black oxide separates



quite freely. This is removed by frequent washing with hot water, and the occasional use of dilute nitric acid. This is continued until trituration under water does not discolor the water. The mass is now placed in an iron ladle, or, better, a porcelain evaporating-dish, and heat applied until all the moisture is driven off. It should now be in the form of a soft paste. The excess of mercury may be pressed out through a chamois-skin. If it is in the form of a dry powder, the heat is continued for a few minutes and the mass thrown into a mortar and thoroughly triturated until it becomes a soft paste. After all the mercury that will separate has been expressed, the mass is again heated and triturated until it again becomes a soft paste. Should a black oxide separate during the process, it is again washed with dilute nitric acid as before. A further portion of mercury is again expressed; the mass again softened by heat and triturated, and then formed into pellets about the size of a large pea and set aside to harden. It should become thoroughly hard in five or six hours. Failure to harden indicates that an excess of mercury remains. This must be expressed as previously directed. By continuing the heating, trituration, and pressure, a very large portion of mercury may be expressed, and the amalgam becomes harder much more rapidly; but we have found no advantage from its being in this condition, and it is more difficult to use.

To prepare it for use, take one of the hardened pellets, and in an iron spoon expose it to heat until it "sweats" mercury; immediately throw it into a small glass mortar and quickly triturate it until it becomes a smooth, soft paste. It may be used in this condition, or if preferred a portion of mercury may be expressed by pressing it in a chamois-skin. Much depends upon the use to be made of it. This amalgam has the peculiarity of hardening perfectly independent of the amount of mercury it contains, without any perceptible shrinkage or expansion, and it becomes much harder than any other amalgam I have used. I refer to it here on this account, and suggest its use in cases where the pulp is nearly exposed. It can be applied without pressure; conducts thermal changes to a far less degree than any other metallic compound used in the mouth; is remarkably preservative of dentine, and, unlike any of the zinc-cements, is absolutely unchanged (except in color) by contact with the oral secretions. If the usual amalgam is used over it, it must first be allowed to become hard, or the excess of mercury will impair the silver alloy. The exposed surface usually becomes a dark brown or black; but so far as I have had experience with it, it does not seem to discolor the tooth as much as the silver alloys. I have been impressed since using it that the cause of the discoloration of amalgam is the silver it contains. This copper amalgam is worthy of a fair trial, and I think it will prove quite useful.

## PROCEEDINGS OF DENTAL SOCIETIES.

## AMERICAN DENTAL ASSOCIATION.—TWENTY-SEVENTH ANNUAL SESSION.

THE twenty-seventh annual session of the American Dental Association was held in the Park Theatre, Niagara Falls, commencing Tuesday, August 2, 1887.

The morning session of the first day, which was devoted to routine business, was called to order by President W. W. Allport, of Chicago, shortly after 11 o'clock.

Among the more important matters considered were, the approval of the report of the action of the officers in changing the place of meeting, and a number of proposed amendments to the constitution, laid over from last year, all of which were indefinitely postponed, except one authorizing the chairman of the executive committee to call meetings of the committee between sessions at the request of five members, which was adopted.

The annual address, the theme of which was a history of associated effort for the advancement of the status of dentistry, was read by the president and referred to the publication committee.

Adjourned to 8 P.M.

FIRST DAY—*Evening Session.*

The association assembled at 8.15 P.M., President Allport in the chair.

Section II, Dental Education, Literature, and Nomenclature was called, and the report was read by the Secretary, Dr. Louis Ottofy, of Chicago.\*

Dr. W. H. Atkinson, New York, then read an unfinished paper on "Nomenclature" and asked for time to complete it, which was granted.

Dr. J. N. Crouse, Chicago, read his paper, entitled "Preliminary Education," which was an argument in favor of the methods of the kindergarten and manual training school. It is an acknowledged law of psychology that thought is made clearer and more definite in the mind by every expression it gives itself in the outside world, be it in clay, wood, iron, or words. The very effort at expression brings concentration and leads to sharper observation, which induces clearer thinking. In the kindergarten the child's faculty of investigation is trained to construction rather than destruction; his whims, caprices, and passions are taught to submit themselves to

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\*The report will appear in a future issue of the DENTAL COSMOS.

law,—self-imposed law; good-will towards other workers is inculcated; and all rejoice in the success of each finished piece of work. So beneficial has this system of training proved that manual training schools have sprung up in all the large cities, and the agitation in the school-world is the effort to change from mere book-knowledge to a training of the faculties, which bids fair to revolutionize the whole plan of education. Without perhaps realizing its educational benefit our dental colleges have been carrying forward this double education of head and hand, which fact will account for their more rapid and thorough advancement than other professional schools. Think for a moment of the advantage it would have been to each member here if he could have had the training of a good kindergarten when a child, and the advantages of the manual training schools which we have to-day, before entering his profession; of the advantages to the future dental student who has gone through in early childhood a good kindergarten, then through a primary or intermediate scientific course, and finally has taken the course in our best manual training schools. This does not imply a neglect of purely intellectual training quite as full and complete as the college course prescribes. All the faculties are trained to think, developed by the head and hand working together; while the mere college graduate is taught to think by reading and studying the thoughts of others, without the added help of either physical development or practical experiment.

#### *Discussion.*

Dr. W. H. Atkinson, New York, with reference to the subject of nomenclature, must say a few words as to the need we have to know the work before us. Not because we do not know the need, but because there is no one to lead the great majority to portray their ideas so that the same word means the same thing in all relations. In science as well as in religion when one has attained advancement it so warms him that he wishes all his friends to make the same advance. It was by the mistake of dividing religion and science that we got into so many ways of expressing the same thought. Dr. Ottofy's paper is the result of laborious effort for which the speaker owed him hearty thanks. If we could grasp the point that the right thing to do is that which is next to us, by the first impact, and know that we were following the divine lead we should accomplish more. The first thought is the best; the sober second thought is often from the devil. He was led to take cognizance of the investigations of naturalists now and at the time when he began his studies. At that time we did know cleanliness, which is said to be akin to godliness. If it were spelled with two o's it would be



better. Listerism and all these efforts in the direction of perfect cleanliness which are now stirring so many brilliant minds that have never been able to take cognizance of the physio-chemistry of the smallest atom perceivable by the most powerful microscope are so many gropings after the truth which underlies change. In every case of poisoning that has been reported what did the medical men in their examination seek for,—a mineral salt that was poisonous; and they did not catch the retrogressive metamorphosis which produced the alkaloidal body which brought about this change. All tissues must take one of three courses: their atoms must combine according to law, producing growth; they must be arrested,—stasis; or they must take downward the steps of the progression,—disintegration. When we have correlated the various steps we shall be able to understand the changes. It is to physio-chemistry we must look for the solution.

Dr. Frank Abbott, New York. In his very exhaustive and very praiseworthy paper Dr. Ottofy mentions the German system in a way that would indicate to those not familiar with the facts that it is superior to the methods of teaching in our own or other countries. He says that the government has charge of the schools. This is true in this way. The government selects the teacher who is to have charge entirely of a certain department, and he has the appointment of the teachers. In the dental school in Berlin this is true. Now if the professor of operative dentistry is pig-headed and likes his own ideas he selects teachers who will teach his ideas, and the pupils are not allowed to receive instructions except in that line. Others may volunteer their services, but they are shut out. Dr. Herbst offered to demonstrate his method before the students, but he was not permitted to. The students must receive only the ideas of this one man, their teacher. There is one feature about dental education here which cannot well be superseded by those in the same position over there. Here the people, from whatever reason, know more about dentistry, and they are willing to pay more for dental services. The result is that they have a fee system on the other side which seems absurd. No matter what is done for the patient the fee is the same. This has been in a measure overcome by some American dentists, but the same mill-stone is around the necks of the great majority, and it will not be removed until the people are educated to a higher point. The great mass of the dentists there are in a low, degraded position compared with practitioners here. Here we have in this body representatives from all over the land; if men have anything to demonstrate to their brethren they are given the opportunity to prove its worth. It is our desire to have our students in the colleges learn all they can from whatever source that will help to make them better dentists.

Dr. R. B. Winder, Baltimore. Dr. Atkinson is right when he speaks of the differences in the meanings of terms. We do need a better nomenclature; but it is difficult to arrange a nomenclature that will describe the thing named, which it should do. Heretofore we have had difficulty in the nomenclature especially of microscopy, histology, and pathology. One person writes on pathology, and he purposely steers clear of the language used by others, avoiding the terms they employed; and this has multiplied until it is a large undertaking to reduce the whole to a common system. In regard to what Dr. Abbott has said about dentistry in Germany, there is a disposition on the part of some of our American dentists to cater to the German idea; to change our system to theirs and thus bring us to their position, on the plea that unless we do meet them there will be no recognition of American dentists. It ought to be remembered that the object of these laws is to keep the American dentist out, and an attempt to change our system to theirs won't work. We don't want to teach as they teach or to turn out such dentists as they turn out. If we did come to their present requirements in order to obtain their recognition they would stick a stake somewhere else to keep us out.

Dr. S. H. Guilford, Philadelphia, had been struck by the difference between two of the papers read. One was away down below the basis of dental education; the other was away above our heads. Dr. Atkinson's ideas may be very clear to him but he had not succeeded in making them clear to the speaker. It reminded him somewhat of the story related of Victor Hugo, who said that he had never known but two persons who spoke perfect French; one of these was a lady, who had, unfortunately, died; the other was himself. Dr. Crouse's paper was extremely elementary, and he doubted if it was proper to bring such a paper before this body. Some things in it were new. It said that education was giving the pupil knowledge. The speaker had always understood that it meant to bring out the faculties that were in the pupil. He thought that Dr. Crouse undervalued the diploma conferred by the higher schools. The speaker's experience had been that the most satisfactory student in the dental schools is the well-educated college graduate. They are given these higher advantages to develop their minds and thus qualify them better to grasp the subjects which may be brought to their attention, and thus be able to better grapple with the difficulties they will encounter. He thought that even in a mechanical calling, a man who is liberally educated is better calculated to achieve success than one who lacks education, other things being equal. He believed in manual training; but the collegian is none the less capable because of his attainments of becoming a fine mani-

pulator, if it is in him, given the opportunity of bringing it out. We should not lose sight of the fact that there are higher aims than the mere training of the hands.

Dr. Abbott had been a little surprised at the criticism of the last speaker on Dr. Atkinson's paper. Liberally educated men certainly understood it; if not, they should become more liberally educated.

Dr. Crouse would have been surprised at Dr. Guilford's remarks, if he had not had a talk with him; he would recommend Dr. Guilford to the study of a well-conducted kindergarten. He had been amazed at the wide-spread ignorance of this means of advanced education among teachers. In his paper he simply stated that the new system was a better way of drawing out what was in the child than the old way. He did say that a college education was largely among the wealthy class a fashion. Their sons are sent to college and taught many things that in all probability will be of no use to them in life, when a manual training would be more useful. In the Polytechnic College, Boston, seventy-five per cent. of the students have positions engaged before they are through with their studies; and a boy from the manual training school in Chicago, who had to work his way through the school could construct a steam engine at eighteen, and he left there to take a position at \$2000 salary.

Dr. J. Taft, Cincinnati. Much of the difficulty in our nomenclature is due to a lack of definiteness of knowledge about the object to be named and a want of knowledge of language. We can name easily and so there will be no mistaking our meaning the things we know most about. The names of those persons we are most familiar with we know, and we recall them readily; of mere acquaintances we recall the names less quickly; while of the stranger whom we have met but once the name may be forgotten entirely. So it is with objects. Let us know the things we want to name, and get a proper knowledge of the means of naming them (language) and we shall have no difficulty. One difficulty we have in understanding Dr. Atkinson is that we are not as familiar with the things he talks about as he is. If we were we might not use the same terms, but we should have no difficulty in giving a correct name. One word with regard to dental education: Dr. Crouse began at the very bottom, which is further than we need to go. We are concerned more particularly with what comes after this preliminary education, the means of drawing out of the dental students their ability to grasp dental studies. Many persons study dentistry because they think it a good thing to do, without the slightest natural endowment for it. It is within the province of members of the profession to encourage those who are naturally endowed and dissuade those who have no natural aptitude. We ought always to act on this idea.



We talk about educating the students. What is a student? If a man is imbued with the proper spirit he is a student all his life. Many young men go through college with the idea that when they graduate they are through with their studies, and as you know the highest point that such men attain to is when they graduate. The young men should be impressed with the idea that at college they are merely laying the foundation for their education, and that they have a hard road, an uphill road, to follow after commencement-day. There is another idea in connection with education which may be profitably pursued. Many men who have not at the commencement of their career had the opportunities that college students now have would be glad to be able to perfect themselves in branches in which they feel a lack. But the college curriculum as now arranged is only for beginners, so that there is no place for the class just referred to. Might we not have means adopted which would permit these men to enlarge their attainments? One word in regard to teachers in the dental schools. How many of us make teaching the work of our life. With most the practice is the great thing; but the speaker was sure that it would be better in all ways if our teachers could devote their whole lives to that work. When we get a good teacher we should sustain him. The way is not clear now, but cannot the means be provided? Cannot endowments that will make it practicable be obtained?

Adjourned to 9 A.M. Wednesday.

#### SECOND DAY—*Morning Session.*

The association met pursuant to adjournment, President Allport in the chair.

The consideration of Section II. was resumed.

Dr. C. R. Butler, Cleveland. In the compilation presented by Dr. Ottofy, are a number of extracts from letters received from the different colleges, and notwithstanding the admitted propriety or the professed desire on their part to advance the term from four or five to six or nine months, the letters abound in excuses why it is not done in fact. That is in keeping with the announcement so frequently made that such and such chairs are filled by certain named gentlemen. The students on their part are required to matriculate and to pay certain fees as their part of the contract. If one buys a piece of land, the contract is not valid if there is not as much land as the deed calls for. Now if the students pay their fees in full they ought to be entitled to the full number of the lectures contracted for, whether the term be three months, six months, or nine months; but the colleges don't make any rebate on the fees if they

do remit some of the lectures. There may be a question as to whether the teaching of dentistry in the schools of Germany is as thorough as it is here; but there is no question as to the thoroughness of the teaching in the private hospitals in Germany and France. It is more thorough than the teaching here, and the only way to overcome the difficulty in the dental departments here is by adopting the same means. The excuse is made that neither teachers nor students can afford the time; but is there anyone who is really in earnest who cannot afford to give the time necessary to acquire a proper knowledge of his profession? If the chairs were endowed here one of the reasons why the contract is not carried out with the students would be gone.

Dr. C. N. Peirce, Philadelphia. The gentleman has evidently never been dean of a dental school, or he would know that the burden of three-fourths of the letters received is as to how short a time it will require to get through. At our school we have lectures during nine months, and the last month, in summer, they are delivered to almost empty benches. The speaker wanted to compliment the secretary of the section on his report, which was certainly the best that had ever been presented by the section. One word as to the paper on primary education. Its purpose was evidently misunderstood, and it would be better appreciated when we all knew the value of manual training to the young. He had been chairman of a committee of a board of education which had under its charge a manual training school, and no severer punishment could be inflicted on one of the pupils than to deprive him of his lesson in carpenter-work or free-hand drawing. He thought the time was fast coming when this kind of teaching would be universally recognized as one of the most important accessories in training the young.

Dr. E. T. Darby, Philadelphia. It would seem as though the advantages were unequally distributed. We find some men who would be glad to have all the advantages available; others who want to apply themselves just as little as will permit them to pass. We find perhaps in the palace of the rich a son who spurns his opportunities; in a court hard by is a poor widow's son who longs for an education that seems beyond his reach. The one may become an outlaw, or at least a nothing; the other occupies a mediocre position because the obstacles in his way were such that he could not rise above them. In dental education we find men who can't afford to stay at college as long as they would like to. We have two courses of seven months each in our college, but we lose students who go to other schools because they can get through in less time. Broad culture is a grand thing; but after all it is the narrow-edged man who makes his way in the world. The speaker would like to have all

receive a broad culture, but some are not fit, not adapted to receive it; nor is it an absolute necessity. In our examinations we find men who excel in theory but who do not have practice in their fingers. Others come with little education who may make the best operators. What he wished to emphasize was the willingness of the schools to keep pace with the advancement of the needs of education. There is no play in life in the schools. It is a tax on the time, the energy, the resources of the teachers, who are entitled to as much praise and as little criticism as your generosity shall accord.

Dr. W. C. Barrett, Buffalo. A word about our nomenclature. We are all aware of the embarrassment which at times almost everyone feels, at least which every public speaker and writer feels, in expressing the ideas which he has conceived in his mind; but he was persuaded that this arises not from any lack of words, but from the multiplication of terms. In examining an object we each of us see some special phase which we desire to convey by the name. This special feature may be very clear to us, but it has no meaning for the rest of the world. As an instance, Dr. Atkinson frequently refers to the "angels" as the source of his ideas. This has no significance to the most of us; we think we elaborate our ideas from our own inner consciousness, and thus have no use for angels and other terms which to us have no real existence. So in his method of expression there is a multiplication of terms the rest of us find no necessity for. Another thing. We are most of us ambitious of using high-sounding words; so we are constantly introducing new terms, which produces confusion. Thus we have now few "mechanical dentists;" most of them are practicing "prosthetic dentistry," and the good old-fashioned mechanical dentist is relegated to the past. Another new term is just coming in,—it was used last night,—"metabolism." What's the matter with the good old "digestion"? So we go on, and we get our language all in confusion by lugging in new, high-sounding terms. If we want to reform our nomenclature the proper way is to simplify it.

Dr. W. B. Knapp, Ft. Wayne, Ind. Upon a higher and more complete education depend the elevation and progress of the profession. Dr. Ottoby has told us where we stand; Dr. Crouse has suggested the beginning of better things; and Dr. Atkinson has shown us what may be attained. The criticism has been passed on the two latter that one was beneath our dignity, and the other beyond our comprehension. If this is true it would seem proper that we should consider why we are unable to understand and discuss the more advanced paper. In his opinion both were eminently pertinent to the question. Science is the outgrowth of reason; to attain science the reasoning powers must be developed. Colborne's



"Arithmetic," which marked a new era in the study of mathematics, was the outcome of its author's recognition of the inherent *why* in every student's composition. It is not enough to deal with students ready to enter our offices or colleges. We should encourage the production of a class qualified by education and training, and especially by their ability to ask and answer the question why, to enter upon the scientific study of dentistry. The great trouble with the present system is not that the course is too classical or too scientific, but that it is a cramming process wherein the practical application is entirely left out.

Dr. Atkinson. A review of the growth of this body and of the local bodies from which it took its origin ought not to be discouraging. Those of us who were here at the beginning ought to be happy over the spread of the means of teaching. It is well enough to have old schools; well enough to have new schools: but the teaching will not avail if the officers and teachers are not inspired with the love of truth. How many colleges had we at the beginning of this association, and how many have we now? Do we owe the great increase in numbers to any one thing? We owe it to the inspiration of necessity. But the trouble is that the colleges assume to themselves all the virtues to be attained. This is not the way to learn. We must hold ourselves ready to absorb every new truth. Too often individual ambition fills the chairs in the colleges instead of seeking men fit to fill and occupy them. A man is fitted for the duties of life just as a child is, by the absorption of the truth as it is presented to him.

Section II. was passed.

(To be continued.)

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The annual election was held on Thursday, August 4, 1887. Old Point Comfort, Va., was selected for the next place of meeting, and the following officers were chosen to serve for the ensuing year: Frank Abbott, New York, president; Charles R. Butler, Cleveland, O., first vice-president; T. Sollers Waters, Baltimore, second vice-president; George H. Cushing, Chicago, recording secretary; Fred. A. Levy, Orange, N. J., corresponding secretary; A. O. Hunt, Iowa City, A. W. Harlan, Chicago, and L. D. Shepard, Boston, members of the executive committee.

The newly-elected president appointed W. W. Walker, New York; M. W. Foster, Baltimore; and T. T. Moore, Columbia, S. C., local committee of arrangements; and E. T. Darby, Philadelphia, and A. W. Harlan, Chicago, members of the publication committee.

## NATIONAL ASSOCIATION OF DENTAL EXAMINERS.

THE National Association of Dental Examiners held its sixth session at Niagara Falls, commencing Monday, August 1, 1887.

President J. Taft in the chair.

The following boards were represented: Illinois, Geo. H. Cushing; Ohio, H. A. Smith, J. Taft, C. R. Butler; Indiana, S. T. Kirk; New Jersey, Fred. A. Levy; Maryland, E. P. Keech, T. S. Waters; Kentucky, A. Wilkes Smith; Massachusetts, L. D. Shepard.

Dr. C. P. Robinson, of the Alabama State Board of Dental Examiners, and Dr. J. B. Willmott, of the Board of Examiners of Ontario, were invited to the privileges of the floor.

Under the call for reports from the state boards, Dr. Cushing, for Illinois, stated that there had been nothing before the board but regular business; no action had been taken against any of the colleges; there were but two applications before the board at the last meeting and both were passed. In reply to a question, Dr. Cushing stated that the legal proceedings brought against the board were still *in statu quo*, but the decision, it was expected, might be announced at the September term of the Supreme Court. One great difficulty has been to secure the prosecution of offenders against the law. That is no part of the business of the board; it is not required under the law, nor would it be practicable. Recently the Chicago Dental Society has appointed a committee on prosecutions, whose business it will be to take care of cases of infringement originating in the city. The committee is now prepared to act.

For Ohio, Dr. H. A. Smith reported that at the last meeting of the board five candidates presented, of whom three were passed; the board had attempted to have the law amended to require registration, and it was hoped that next winter the law would be improved to correspond with the best legislation on this subject.

For Indiana, Dr. Kirk reported that under the old law, which was in force nearly eight years, the number of examinations by the board grew steadily less. At the last session of the legislature an entirely new law was passed, owing to defects discovered in the old act. The new law is thought to be a good one; it requires registration before the board and also before the county recorder. Just before this law went into effect the board held a large number of examinations under the clause of the old act; some of the applicants being from other states. About twenty were passed, most of them being found pretty fair practitioners. When the new law went into effect it was found to provide a great deal of work for the examiners at the start. It is thought it will be efficient; about three-fifths of the practitioners in the state are now registered.

For Maryland Dr. Keech reported that there was not a single case entitled to registration under the law that was not registered, and but one person practicing in violation of the law, and this will be reached. At the meeting of the board in June five candidates offered; of these four passed. The examination is both theoretical and practical, and it is made pretty thorough on the ground that we don't purpose to offer a premium on this mode of admission. The law is working very well.

For Kentucky, Dr. A. Wilkes Smith stated that during the past year they had succeeded in procuring an amendment to the law, requiring registration. Last November the board held a session, and probably three-fifths of the dentists in the state registered. At the time of the last meeting of the State Society another session of the board was held and there are now probably four-fifths of the dentists registered. Two candidates for examination presented, and both passed. There are fewer applications for examination each year, and we think our law a good one.

For Massachusetts, Dr. Shepard said that in regard to the matter of the dental law the state has been particularly jealous of class legislation. Dr. Shepard then detailed the history of previous efforts to procure legislation. Last year, he continued, one man, without consultation with other practitioners, took it upon himself to get up a law and work it through the legislature. This law is a law of registration primarily, and six months from the first of April last were allowed for those in practice to register. The second prominent feature of the law is that after the first of October all persons entering practice must have a license from the board and the board must give all applicants for license an examination, whether the applicants are graduates of colleges or not, and no matter what college they come from. Section 9 says that nothing in the act shall apply to graduates of recognized medical colleges. Under this clause some dentists who have the M.D. degree have refused to register, claiming that they were regular graduates in medicine practicing the specialty of dentistry.

Dr. Willmott in reply to a query said that the Province of Ontario has had a registration law since 1868. Our board has refused to accept the sworn statements of applicants when the members were cognizant of the falsity of the oath. We have had no legal troubles though we have been threatened several times with proceedings. Our law is like that of Massachusetts in this regard: both require examination by the board. Even the students who graduate at the Royal College of Surgeons of Ontario must submit to it. The legislature has committed the entire charge of dental education to the care of the examining board: we say who shall study dentistry. Our standard of matriculation is practically that of arts.



For New Jersey, Dr. Levy reported that the board has been almost legislated out of existence. We allow none but graduates of reputable dental colleges to enter upon practice, and we decide what colleges are reputable. All are required to register their diplomas and to have them countersigned by the county clerk of their county within thirty days after beginning practice. The holders are subject to fine and imprisonment if the diplomas are not registered.

Under methods of procedure, Dr. Keech reported for the Maryland board that their examination was both theoretical and practical. In prosthetic dentistry we have required the applicant to take the impression and produce a piece of metal work in the presence of the board. In operative dentistry we require a tooth to be filled in the mouth, not out of it.

Dr. Butler had been most favorably impressed by the method pursued by the Michigan board. They require candidates to make a gold filling in the mouth in the presence of the board.

Dr. Shepard read the provisions of the Massachusetts law on this subject, which are very explicit. (See Massachusetts Dental Law, DENTAL COSMOS, June, 1887, p. 407.)

Dr. Kirk stated that under the old law the Indiana board divided the subjects between the members. He had been assigned to operative dentistry, and he had never passed an applicant without a practical demonstration. At the last examination where there were so many candidates owing to the change in the law, they had to do the best they could. His board had not heretofore, he thought, required a practical demonstration in mechanical dentistry.

Dr. Cushing. At the examinations of the Illinois State board the questions are always written or printed, and written answers are required. The examination for temporary license is made as stringent as for permanent. We require seventy-five per cent. of all the questions to be answered properly, and seventy-five per cent. absolutely in four subjects. If the candidate fails in anatomy, physiology, theory and practice, or surgery, he cannot pass. He thought the practical demonstration desirable; should there be a considerable number of applicants in future his board will probably require it.

Dr. A. Wilkes Smith. In Kentucky we have adopted a written examination similar to that in colleges, and we require the applicant to write his answers in the presence of the board. The questions are placed on the board in blocks and we require the applicants to take the same pledge exacted in medical and dental colleges, not to give or receive information. We divide the work among the members of the board, and we require an average of seventy-five per cent. Our two applicants at the last meeting gave practical demonstrations. We think this a good feature.

Dr. Kirk. The Indiana board desires to advise with the National

Association of Dental Examiners on some questions that have arisen. We have seen fit since the organization of the new board to refuse to grant registration to the diplomas of three dental colleges. He thereupon presented an abstract of the proceedings of the Indiana board showing the action which had been taken. The colleges referred to were the institution at Delavan, the Hospital College of Louisville (Louisville College of Dentistry), and University of Tennessee, Dental Department.

Prof. A. Wilkes Smith, dean of the Louisville College of Dentistry, presented a complete history of the case in which his college was involved, from the college stand-point.

Dr. W. C. Barrett, Buffalo, being present was asked for his views on the general object of the association, said that he felt sure it was within the power of the state boards to raise the standard of requirements in the colleges, which is low enough. American diplomas are becoming discredited abroad; so much so that the D.D.S. is in many cases an embarrassment rather than an advantage to persons seeking to commence practice on the other side of the ocean. This has been brought about largely by the colleges themselves. Some of the most reputable have in the past received men who could not speak English, as second-course students, and graduated them after attendance at one session; and the graduates would return home after only a few months' absence bearing the coveted degree. If the state boards will inquire carefully into every case that comes within their jurisdiction and expose and discredit every institution found guilty of irregularities the standard of education will be raised. The boards should hold the colleges to a strict accountability and judge them by what they do, not by what they profess; they must suffer the consequences of their acts. We must do something, for colleges are springing up all over the land, always under the plea of raising the status of dentistry. You are aware of the resolution adopted by the American Medical Association. This, if strictly adhered to according to an obvious interpretation, will tend to raise the status of dentistry; but recent indications led him to fear that careful discrimination was not going to be made. This instead of raising the standard will depress and lower the status of dentistry. The dental associations can act as a guide to the medical associations, provided they adhere to their terms and strictly discriminate. If state boards of examiners simply condone offenses when committed they will not do justice to themselves or to their cause. He hoped that every member of the state boards will act with the idea that a very grave responsibility rests upon him.

After thorough discussion the case of the Louisville College of Dentistry was referred to a committee consisting of Drs. Shepard, H. A.

Smith, and Keech, who, after full consideration, submitted at a subsequent session the following report, which was unanimously adopted :

In a circular issued by the secretary of the Indiana State Board of Dental Examiners, dated July 5, 1887, notice is given that "the board has decided against accepting the testimonial from the Dental Department of Hospital College, Louisville, Ky." (Louisville College of Dentistry.)

The Indiana board has presented its statement of the case to this Association and the dean of the Dental Department of the Central University of Kentucky (Louisville College of Dentistry) has given a full statement of its side of the case, has made a frank acknowledgment of the mistake made, and has given assurances that hereafter no one shall have cause to complain, and that so far as is in the power of the college it will rectify this mistake and any others; therefore

*Resolved*, 1. That the Indiana board only did its duty in refusing to accept the diploma from said college in this particular case.

2. It is recommended to all State boards to confer with a college whose diplomas are questioned before publishing it as derelict, to the end that no injustice may be done, particularly to those who have honestly earned their diplomas from such institution.

It is possible that such a diploma might be issued without the slightest intention on the part of the college to depart from the standard governing the boards, as is claimed was the case in this instance.

Dr. Willmott was granted the floor, and referring to the resolution adopted at Minneapolis by the association concerning the diplomas of the Royal College of Surgeons of Ontario, made a full statement of the college's side of the case. The matter was referred to the committee previously appointed, which subsequently reported as follows :

The committee to whom was referred the application of the Royal College of Surgeons of Ontario to have rescinded the action taken by this association which decided that their L.D.S. should not be accepted as equivalent to a dental degree to save examination by the boards of examiners respectfully reports :

That the action heretofore taken by this association should stand, for the following reasons.

1. That the L.D.S. granted in Ontario is a local license to practice, not recognized in all the provinces of the Dominion nor in Great Britain, rather than a degree in dentistry conferred on the completion of a college education. In this respect it is analogous to the licenses granted by one of our state boards, which are not generally recognized by the boards of other states.

2. That when the L.D.S. is granted as a degree in dentistry on the completion of the required course in their school of dentistry it represents two courses of four months each, while our rules require two courses of at least five months each.

3. That in their last announcement they advertise to grant the L.D.S. for a fee and after examination upon any non-resident who has been in practice three years, exclusive of two years' pupillage, *sine curriculo*.

The report was adopted.

Dr. Kirk read the charges of the Indiana board against the University of Tennessee, Dental Department, with the correspondence,



etc. Referred to a committee consisting of Drs. Cushing, Butler, and Keech. The report of the committee, which was submitted at a later session, was adopted unanimously as follows:

Your committee to whom was referred the action of the Indiana State Board of Dental Examiners in relation to the rejection of the dental diplomas of the University of Tennessee, find that the University of Tennessee as per its announcements, has granted dental diplomas to those who have attended only one course of lectures in any institution, which practice is in direct opposition to the resolutions of this association adopted in 1884, in which it was resolved "that after June, 1885, the various state boards composing this association be instructed to refuse the diplomas of any college which does not require as a prerequisite for graduation attendance upon two full regular courses of lectures and practical instruction of not less than five months' duration, and held in separate years."

The University of Tennessee must have been fully cognizant of this fact, as copies of the transactions of this association were forwarded to them, and the transactions were also published in the dental journals; hence they must have issued diplomas after the date above named with the certainty that they would not be received by the state boards represented in this body, and can therefore have no ground of complaint against any board for rejecting them.

Your committee find that the Indiana state board acted "as in duty bound" and recommend that this association fully indorse their action in this case.

The secretary was instructed to make a note that this association deems it inexpedient to recommend state boards to accept the certificates of license issued by the authorities in other states.

On the subject of granting temporary licenses Dr. Kirk stated that under the old law in Indiana temporary licenses were granted by individual members of the board; the new law says nothing about it. Few who received temporary license failed to pass the regular examination. Dr. H. A. Smith said that it had not been the custom to grant them in Ohio. For those who desired to begin practice between sessions of the board examinations were held outside of the regular time. Dr. A. Wilkes Smith reported that the Kentucky law did not recognize temporary licenses; the board must give a full examination to every applicant; between sessions applicants can visit the various examiners at their homes. In Maryland, Dr. Keech said temporary licenses are not granted as a rule. Dr. Shepard reported that the Massachusetts law makes no provision for temporary license. In Illinois temporary certificates are granted on examination, Dr. Cushing reported, but the examination is as strict as that for permanent certificate. Dr. Levy said the New Jersey board does not grant temporary license.

At the annual election the following officers were chosen: Geo. H. Cushing, Chicago, president; T. Sollers Waters, Baltimore, vice-president; Fred A. Levy, Orange, N. J., secretary and treasurer.

Adjourned to the Monday previous to the next meeting of the American Dental Association, at the place chosen for the latter.

## NEW YORK ODONTOLOGICAL SOCIETY.

THE New York Odontological Society held its regular monthly meeting, Tuesday evening, June 14, 1887, in the Hall of the New York Academy of Medicine, No. 12 West Thirty-first street.

The president, Dr. E. A. Bogue, in the chair.\*

C. A. Brackett, D.M.D., of Newport, R. I., read the following paper, entitled

## A CONTRIBUTION TO THE DISCUSSION OF DR. I. B. DAVENPORT'S PAPER.

Mr. President and Gentlemen: In coming before you this evening I labor under the embarrassment of not having been present at the previous meetings of the society at which the subjects under discussion this evening have had your attention, and I may be guilty not only of presenting what you may consider crude and unwise, but of saying in a poor, weak way that which has already been said strongly and convincingly. What I do say, however, is said conscientiously; is the result of some experience, and the truth of at least portions of my propositions may be demonstrated before you.

I have to thank our honored president for the courtesy of a copy of Dr. Davenport's admirable paper, the careful preparation of which is evident. In its scientific conclusions everyone must find much to cordially indorse. I am particularly gratified with the prominence it gives to the matter of antagonism. I have long felt this to be of very great consequence in a large part of the operations which we perform; and it should always be carefully considered whenever we are planning operations or any procedures of sacrifice, replacement, or substitution in the mouth.

No one can gainsay the beauty and utility of the typical dental arches, or of the organic totality of the physical expression of the perfect man. On these points there can be no difference of opinion; and when our author points out, as he does with models and illustrations, the deplorable consequences of ill-considered and unwise interference, either by extraction or by cutting spaces, with the mechanical perfection of these arches, we are all with him and see as he sees. For the perfect mouth the theory is perfect; but if he advocates in practice the indiscriminate retention of thirty-two teeth in every mouth that comes to us seeking and asking the exercise of the best judgment and the best skill for its general and per-

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\* "Incidents of Office Practice," the first order of business, is necessarily laid over to the October issue.

manent well-being, there must arise an honest difference of opinion, and there are few, if any, practical men who will not dissent, not to say earnestly protest. In the discussion of this question at recent meetings of the society there have already been made very many of these protests. They are protests which might and should have been supported by more practical demonstrations of what may be accomplished by judicious extraction.

Dr. Davenport has gathered deliberately through long time and placed before the society a large collection of models showing the pernicious effects of unwise extraction and reckless making of flat spaces. These models speak for themselves, and, being collected for that purpose, show what they purport to show,—results in varying degrees to be regretted and deplored. That there have not been exhibited more models showing good results of *wise* extraction is readily explainable. Many patients object to the disagreeableness of having impressions taken, and to what they fear may be the publicity with identity of the exhibition of the models. Many others are not continuously under the care of any one dentist for such length of time that a connected account of their cases could be given. Many practitioners do not keep careful records, or they are constantly so overworked as to find no time in which to take impressions and make models; or their interest is in other details of practice; or their attention is absorbed in other affairs; or they are indifferent, careless, or indisposed to the necessary exertion of making and bringing here models with histories of cases. The concentration of deliberate, devoted study of one aspect of a subject, with positive expression of conclusions by one earnest, able man, is not fitly met by the mere indifference or by the comparatively desultory and hasty responses of a hundred men. I have not seen and talked with any dentist upon the subject in many weeks who did not claim to be able to show from his practice gratifying results from the extraction of sixth-year molars; but their models are not here.

Dr. Davenport's argument, extended to absurdity, would maintain that art,—surgical art,—in her attempts to assist and supplement nature, should stop short of the sacrifice of any individual organ or portion of the economy for the advantage of the remainder or for the general good,—a postulate as unscientific and unjustifiable in practice as it is unscriptural. Notwithstanding the fact that the Bible is a work promulgated in primitive times, it teaches some principles in hygiene and surgery as sound as are its teachings in morals and religion, and as immutable as any other laws of the universe. In the practice of the surgical branch of the healing art there are constantly being made sacrifices of tissue for the general



good of the system, and dental surgery is in no wise exempt from the general law. No man objects to the removal of caries from a tooth in order that that portion of it which still remains sound may be saved from further disintegration through protective obturation of the cavity; no man objects to the judicious beveling away of the broadly carious distal surface of the second temporary molar as a measure of prevention of decay in the mesial surface of the first permanent molar; no man should object to the entire sacrifice of the first molars or of any other teeth, if through such sacrifice there can be attained the best results which are possible for the whole denture.

I am not an advocate for the general or indiscriminate, or even frequent, extraction of sixth-year molars. I am opposed to such practice as a rule; but I do believe there is a percentage, perhaps a small percentage, of cases in which it is the best course to pursue, and in which the results are intrinsically really excellent. Teeth in

FIG. 1.



FIG. 1. Buccal aspect.

themselves bad,—useless, diseased wrecks, exerting a deleterious influence upon their neighbors and upon the general health and comfort,—are eliminated; crowding is relieved, irregularity is made self-correcting, or its correction with appliances is greatly facilitated; approximal surfaces are made self-cleansing and self-protecting,—in brief, the simple operation of extraction in the case in which it is unmistakably indicated does more than any other procedure or series of procedures could do toward giving the patient the best possible masticatory apparatus for a lifetime, with the least endurance, effort, and expense.

Here are some models. This one (see Fig. 1) is of the mouth of a young lady who was born October 27, 1864. Her four sixth-year molars, extensively carious, were extracted November 10, 1875, the

patient being then aged eleven. At the time of extracting the molars considerable irregularity of the incisors existed, but no appliances have been needed for its correction. This model was made from impressions taken May 5, 1887, eleven and one-half years after the extractions, and at the age of twenty-two and a half. Up to that date, seventeen fillings had been made in the mouth. Of these, thirteen are in coronal fissures and pits of bicuspid and molars, and only four are in approximal surfaces. There seems every reason to expect that the patient, with a very limited amount of operative assistance, will keep all of these twenty-eight teeth in their present positions for a lifetime. There is little that is favorable in the heredity of the case. The patient's mother has tried from childhood to care for and save her own natural teeth as well as possible. She has now twelve lower ones and eight upper ones, and she is still in

FIG. 1a.

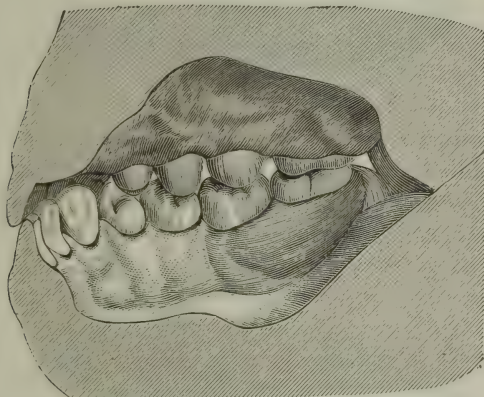


FIG. 1a. Section through median line showing occlusion on lingual side.

early middle life. The patient's father has lately died at the age of forty-eight. For the last third of that time his natural teeth remaining had been but the lower incisors, cuspids, and part of the bicuspid. He had worn a full upper artificial set for years.

This model (see Fig. 2) is of the mouth of a young man who was born May 14, 1869. The sixth-year molars, then very largely carious, and the three remaining temporary second molars were extracted September 17, 1881, the patient being then at the age of twelve years and five months, and getting the permanent teeth not quite so soon as most children. At that date all of the second bicuspid were erupting. The model was made from impressions taken May 7, 1887, at the age of eighteen. While the front of the mouth is all that could be desired, it does not make the complete showing which it will a little later, when the third molars, now erupting, have

become fully developed. Fillings have been needed, but not to any great extent, and recently there have been repeated half-yearly examinations without any caries being found. In this case, also, the heredity is not good. When the son was six years old (which is

FIG. 2.

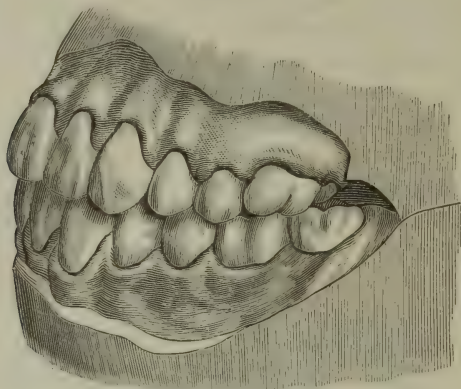


FIG. 2. Buccal aspect.

as far back as my knowledge of the case goes) the mother had eight lower teeth and six upper ones, and the father barely so many. I cannot now foresee why the son should not easily keep indefinitely all of those which he now has. No appliances were needed for

FIG. 2a.

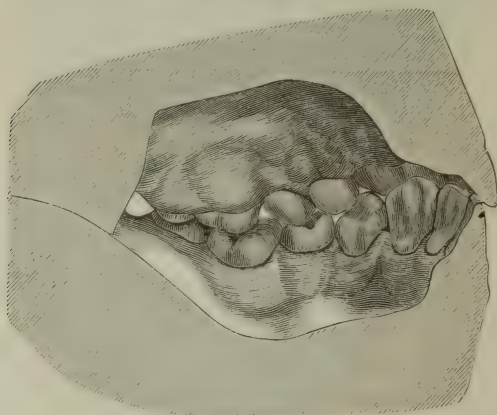


FIG 2a. Section through median line.

regulating. In the mouth of a sister a few years older the sixth-year molars have been kept, and very earnest efforts to correct irregularity have failed.

These models are samples of many that could be shown from the



practice of any dentist who has wisely extracted sixth-year molars when that has been the plain indication. I believe it is right to claim for such cases a high degree of success. There are multitudes of other cases in which, while the success is less marked,—particularly less marked as shown by a model,—the extraction of sixth-year molars is justifiable and advisable, as providing the least of evils, some of which must be endured.

This is hardly the place to consider the details of treatment, but we all well know that the ultimate success of any operation depends upon every step in the process being taken just right. If sixth-year molars are to be extracted, I believe it to be of great importance that it be done at just the right time, and this right time I believe to be when the teeth have attained about the degree of development usual at twelve years. In some of the cases represented by Dr. Davenport's models they had evidently been prematurely extracted; in others an extraction of perhaps a single tooth had been made from a well-occluding and firmly-fixed set at an age such that little if any closing-up of the space could take place; or the four first molars had been extracted so late that there was a very unsatisfactory forward tipping of the twelfth-year molars instead of a moving bodily to occupy perpendicularly a portion of the gained space.

It is well also for us in this connection to have certain principles of heredity clearly in our mind. We are not responsible for bad race-admixtures, mischievous type-blendings, imperfect developments, that have come out of the ancestry or the surroundings of the past; and so far as our responsibility to future generations is concerned it is well established that any good influences which it is in our power to exert must operate, not through surgical or mechanical channels, but through selectional, developmental, and cultivational ones. If there is to be produced a generation of men who shall include, with all other physical perfections, the ideal dental arches, they must be the progeny through generations of the best possible heredity living throughout in the most favorable environment, in the broadest sense of that term.

With regard to that part of Dr. Davenport's paper which relates to the cutting of spaces between the teeth, I have little to say. I believe there are instances in which judicious cutting of the teeth is advisable; but for the comfort of the patient and the general well-being of the mouth I know of no such generally satisfactory plan of operating as that which properly wedges teeth apart preparatory to filling approximal cavities with full restoration, and in some instances exaggeration, of contour, and if attainable, contact only of metal against metal. I have found in my own practice, as a rule, most satisfaction from this course.

It would be tedious and it is unnecessary to rehearse here the combinations of circumstances in different cases which constitute in practice difficulties not all of which can be surmounted or set aside. In the face of these difficulties that procedure is to be commended which combines the most of good and the least of harm. In cases of doubt we should incline, as the essayist would have us incline, toward the less interference with nature rather than the greater. Perfect mouths are rare; unvarying success is not attained by anyone in any kind of operations; but we should try always to get and keep as near these high standards as possible, remembering that "No endeavor is in vain."

The President. I wish to express to Dr. Brackett our cordial acknowledgments both for preparing himself to answer, so far as he might, the questions which have arisen on this subject lately and for the pleasure of seeing him here personally this evening. Before we enter upon the discussion of this paper I will beg Dr. Dodge to favor us with his contribution.

Dr. J. Smith Dodge, Jr. Dr. Brackett's very interesting paper enables me almost to suppress the apology with which I had intended to begin. My paper will be found short, for the fact is there was some misunderstanding. I was not impressed with the fact until two or three days ago that I was expected to produce a paper here. I thought I was asked merely to be one of several who, having read Dr. Davenport's paper, would comment upon it, and I had arranged my thoughts with that view, and expected to occupy the floor for ten or fifteen minutes. Having learned first from the printed notice of the meeting that I was to read a paper, I thought it would become me to do what I could; therefore, with this very short notice, I have produced a paper which I shall take pleasure in reading. I do not apologize for anything which this paper contains, nor for the manner in which it is said, but only for the brevity of it.

J. Smith Dodge, Jr., M.D., D.D.S., then read the following paper on

#### EXTRACTING TEETH.

Dr. Davenport's paper has already been so much discussed that it would be impertinent to offer an elaborate review of it. Permit me first to say that it shows an admirable thoroughness of investigation, and great clearness of expression, so that it is a model of what a scientific essay should be. That I do not agree with some of its important conclusions, by no means blinds me to the great merit of the paper.

I shall confine myself to the consideration of a very important

principle which lies at the root of much of our practice, and in regard to which the paper in question agrees with and supports the view now most frequently expressed. From this view my experience compels me to differ, and I shall devote this essay to that subject alone.

The question before us is the propriety of extracting teeth for various causes.

Dr. Davenport demonstrates the beautiful precision with which the teeth of the two jaws meet each other when perfectly normal, and the necessity (as he thinks) of such an adjustment for perfect mastication; and having shown that the removal of even a single tooth disturbs the relations of all its neighbors, he draws the conclusion that no tooth should be removed if dental art can possibly save it. This doctrine is supported by many eminent names, and indeed has seemed of late to hold the field, principally because those who object to it are content quietly to go their own way and say nothing. To me it seems an extreme of erroneous teaching to which we have come in the reaction from a former practice of indiscriminate extraction. Of the two extremes, I certainly prefer that which keeps too many teeth; but there need be no extreme, and there should be no sweeping general rule. Let each case be weighed by its own merits, and an independent judgment formed in each. The opinion which I advocate is that it is often a great advantage to a mouth to remove one or several teeth, sometimes entirely sound ones, and that when it is an advantage it is as much the dentist's duty and as sure a mark of high scientific attainment to extract as it is in other cases to preserve.

If we take first the *a priori* view, it is remarkable that the teeth are so fitted for extraction. The design which governs the formation of the teeth (for recent experience has by no means taught me to abandon that view) seems to include their easy removal under certain circumstances. Natural processes conspicuously induce in the mouth a strict survival of the fittest. A mouthful of teeth left entirely to themselves will seldom remain perfect, and not very often fail entirely. Certain teeth in almost every denture are of lower grade than their fellows, and are lost by gradual decay, breakage, absorption of roots, and final expulsion, while the other teeth remain for years whole and firm. This is as much a natural process as any other pathological sequence, and it is nature's way of eliminating weak teeth. Now, while all this is going on the constitution seems hardly to feel it. Even when the pulp inflames and aches, the pain produces an astonishingly small general disturbance as compared with equal pains elsewhere, and the gradual dissolution and expulsion of the organ seems positively of no concern to the



general vitality, beyond the indirect effect upon digestion produced by the loss of masticating power. Compare this with the history of other organs; for instance, those which are so nearly external that the surgeon does not hesitate to remove them for disease—the eye, the tongue, the testicle, the mammary gland: all these are frequently and safely removed. They cannot be called necessary to life, and yet nature has no process for getting rid of them. If they are even slightly diseased the general health is profoundly affected, the constitution fights for their preservation, and when they are destroyed by the undisturbed process of disease, it costs the system an effort little short of death to throw off the useless wreck. For a worthless tooth the system has no care,—hews it away and casts it out; for a diseased eye the same system fights to the bitter end.

Similar reflections may be made upon the surgical removal of the teeth. All nations, however savage, seem to have known that teeth may be drawn or knocked out with impunity. When any small degree of skill is used, the operation is most kindly accepted by the part, and repair immediately follows. No other equal part of the body is so submissive. A molar may not differ much in mass from the last phalanx of the little finger; but you may wrench out the molar with only a moment's pain, while if you should twist off the phalanx and give it no care the consequences might be serious indeed. For all these reasons, I am persuaded that the original design of the teeth includes a facility of removal not found in any other organ.

Let us next consider the known results of the loss of teeth. When this is so great that there remain no antagonists mechanically capable of mastication, the result is generally, but not always, an impairment of digestion, and frequently great discomfort about the mouth. But when it leaves teeth opposed which have surface and strength enough, though the fine articulation of cusps be destroyed and the denture what Dr. Davenport calls a wreck, yet it is surprising how little the wrecked patient may know of his sad condition. Of all the well-fed and eupeptic gentlemen in this room, how many have thirty-two teeth? and of those who still have four or six well-articulated molars, how many are accustomed to think of their wretched state? Since I have read Dr. Davenport's paper I have looked with interest at the many patients in advanced life who have sat in my chair, well nourished and happy, with gaps scattered all around their mouths. The result of losing a few scattered teeth may be ruin and disaster, but it takes a dentist with a theory to find it out. The general experience of mankind gives the same conclusion as may be drawn from nature's tolerance of dental loss: that the original design includes occasional dental mutilation.

Permit me now to specify the principal reasons for which I think it wise to remove teeth. *First*, to make room for the others. I have not brought any casts to demonstrate the success of regulating by removal. Probably Dr. Davenport would find the cusps so disarranged that he would not call it success. But I know, and so do most of the gentlemen present, many mouths which have needed no other regulating process for prominent cuspids and crowded incisors than the removal of the first bicuspid. No operation in dentistry gives surer results. I remember, too, an extreme case where the cuspids came late and entirely out of the closed arch, and the mouth was restored to exceptional beauty by extracting the cuspids, the first bicuspid touching the laterals. There is hardly a tooth except the upper centrals which I have not extracted or seen extracted with marked success for the simplifying of the regulating process. *Secondly*, I extract teeth which are obvious failures from mouths in which the other teeth are of better quality. If I find in a new mouth fairly good second molars just come, with the first molars decayed all over, or half broken away, with exposed pulp or abscess, I make no delay in removing the first molars. They are failures, and nature is trying to get rid of them. When a tooth has long been defying my best skill; has been carefully treated to the apices of the roots, and will not be quiet; has been dosed outside and inside with the whole dental pharmacopeia and still rebels, unless it is absolutely indispensable, I condemn it as doing and sure to do more harm than good. This very day a new patient said to me: "There is a tooth which I wanted to have out, but the dentist wasn't willing." I found a molar very largely filled and well filled. He said the pulp had been removed and the roots filled, and by the character of other operations in his mouth I saw he had been in skillful hands. But he added: "It grumbles whenever I have a little cold, and is so tender if I chew on it that I have given up using that side of my mouth." This gentleman has never lost a tooth, and I shall not condemn this one without further acquaintance. But if this proves a permanent condition (as it may), the question may be fairly raised whether it is worth while to give up the entire use of half the mouth in order to retain the nice adjustment of the cusps. *Thirdly*, I extract teeth sometimes to save their neighbors. Suppose a molar and adjacent bicuspid which have been filled rather largely on the surfaces of contact, and are now again decayed at the cervical border of those fillings. The new cavities are far under the gum, with no satisfactory border toward the root. A deep pocket has formed between the two teeth, and both cavities are sensitive. Suppose the row of teeth unbroken, and the others pretty good. Those of us who are over forty will not have much hope of any fillings that may be made there,

no matter with what skill. But extract the bicuspid, and any tyro can save the molar. Precisely the same condition occurs between the second and third molars, especially of the upper jaw, and it is equally simplified by removing the wisdom-tooth.

These are but examples and illustrations which might be greatly multiplied, but they are enough.

I hope I shall not be thought of as one who lightly removes teeth, nor as sacrificing my patients' welfare to make easy my own work. Nobody, I will make bold to say, fights harder or longer than I do to retain poor teeth which are better in than out. And I am not willing to believe that anyone has more success than I. But I insist that the one object to be held steadily in view is, not the marvel of the operation, nor any arbitrary rule as to the proper number of human teeth, but the comfort and welfare of each mouth judged by its own condition and managed according to its own requirements. This is scientific treatment, and it is guided by no hard and fast rules, but grows out of the best instruction, the most thoughtful experience, and the ripest judgment applied case by case to each tooth in every mouth.

The President. Gentlemen, the question is open for discussion; and in the light of the two papers which you have just heard I hope further views will be elicited that will be both interesting and valuable.

There are two letters here which had better be read at this time, as they may provoke discussion. One is from Dr. Underwood, of London, and one from Dr. J. N. Crouse, of Chicago. Dr. Crouse says:

Gentlemen: I cannot give the subject of your communication the necessary time, but if I presented models the weight of the evidence would be against the extraction of the sixth-year molars as a common practice. I am sure I could produce convincing evidence that much injury has been done in some cases by the extraction of the sixth-year molars. I have seen a few extreme cases, however, where it had not done much injury, and had perhaps resulted in some good.

The secretary then read a communication from Dr. Arthur Underwood, of London, England, as follows:

Gentlemen: The more I think over the extraction of sound sixth-year molars, at an early age, to avoid over-crowding, the more I am inclined against the practice, and the less do the arguments in its favor impress me. At the same time it is, I think, very dangerous to lay down general rules of practice in a matter in which common-



sense will almost always lead us to modify our treatment to suit individual cases. There are no two mouths alike, and I think sweeping general laws likely to do more mischief than good. I will now trespass on your time, as you have so kindly asked me to do, and suggest a few considerations that have occurred to me, without claiming the least originality for any of them. First, the sixth-year molar has a bad name as being specially liable to decay, and statistics show that it is more frequently affected; but this is not due to any inherent weakness in the tooth, but rather to the fact that it is exposed to more severe trials. From the age of five to the age of twelve is a period of special danger to dental structures. The fevers and disturbances from which childhood is rarely free are attended with a condition of saliva confessedly injurious.

The remedies for the disorders of childhood are often as injurious to the teeth as the disorders themselves,—notably mercury. The effects of this drug in arresting or impeding the formation of enamel may be seen over and over again, reminding one almost of a tide-mark on the teeth, showing the exact time when mischief ceased its work and the enamel-formation went on normally again. Again, not only is this period of life one liable to illnesses perverting the saliva and promoting caries; not only is the sixth-year molar unlucky in having to form its crown during a time when teething powders may be arresting the enamel-formation, but the age is also one at which the child does not realize the importance of its teeth, and does not generally take proper care of them. It seems to me the remedy for such a state of affairs is not the condemnation of the sixth-year molars, but rather the most zealous attention to them during their critical early life. These teeth are not feeble; they are exposed to much that is injurious; also, more neglected than any other teeth, and if the children could be seen at short intervals, and caries dealt with in its commencements, I believe the statistics would no longer show the same preponderance of decay for them.

Anatomically (always excepting honeycombed first molars) they should be the largest and healthiest teeth in the head. Granted that, properly cared for, the sixth-year molar is as good a tooth, if not better than its neighbors, what remains behind when it is gone? Only two molars, one of which is pretty generally allowed to be disappearing from the series! No other tooth is so unreliable and uncertain as the wisdom-tooth; no other is so often deformed, so often the cause of serious constitutional disturbance. I do not think any dentist is justified in placing much reliance on a possibly serviceable wisdom-tooth, and the twelfth-year molars alone are not sufficient to do the mastication which falls to the molar series.

Then, with regard to obtaining room for crowded cuspids, I think

the extra space due to the size of the molar is counterbalanced by the fact that the twelfth-year molar comes forward faster than the bicuspid goes back; that the less teeth are moved the better, because lateral movement involves either a change of direction of the axes, or movement of the apex of the root, and because the shorter the time during which the regulating-plate is worn the better for the other teeth, and that a bicuspid is less amenable to treatment, if it should become diseased, than a molar. I think there is prevalent an unnecessarily hopeless idea regarding sixth-year molars. When such teeth are honeycombed, or, owing to the neglect of parents, have been allowed to reach a hopeless condition, then of course what I have said above would not apply, but when the teeth are sound or only moderately decayed, I should make every effort to save them. After their premature extraction, I have often seen the twelfth-year molars lean forward obliquely.

### *Discussion.*

Dr. Brackett. I am not in accord with the idea expressed in Dr. Underwood's communication, if I understand it, that the sixth-year molar is not more poorly constructed than the other teeth in the series. It is my idea that, being developed first among those of the second set, and coming nearest in time to the development of the first set, it partakes more of the character of the first set than any other of the teeth of the second set. While it is true that it exists in an unfavorable environment, yet, if it were as strong to resist the deleterious influences of that environment as the incisors are, there would not be that difference that we see between the character of the sixth-year molar and the incisor. I would not be understood at all as advocating anything like a general extraction of the sixth-year molars. I am not an advocate of their indiscriminate extraction; but I believe there is a percentage of cases in which the extraction of the sixth-year molars is advisable.

The closing statement in the paper last read, about the occasional forward tipping of the second molar as a result of the premature extraction of the first molar, it seems to me is not quite as it should be. The premature extraction of the first molar I should expect to lead to the coming forward of the second molar so as to occupy more of the room in the anterior portion of the arch than is desirable, and at the expense of the cuspids and bicuspid. It seems to me that the undesirable tipping and the imperfect closing of the spaces are not due to the premature extraction, but that it may come from too great delay of the extraction of the sixth-year molar.

Dr. A. L. Northrop. I think that the essayists have all aimed at the same point,—that is, the honest saving and the honest extrac-

tion of teeth. I think it is impossible under all circumstances to preserve thirty-two teeth in the mouth. The patient comes to the dentist as to a physician, for advice and treatment, and it is for him to decide what is for the best interest of that patient. I do not think a dentist could be found who would get up before this or any other body and say that he was in favor of extracting all sixth-year molars. Neither do I think a dentist can be found who will say that he believes thirty-two teeth can be saved in every mouth. Hence I think that the paper read by Dr. Brackett will express the sentiments of the majority of dentists as nearly as any paper that we have heard read on this subject. There are cases in which we have to extract sixth-year molars, and, when looked at years afterwards, we have been led to say that if our foresight had been as good as our hindsight we would not have done so. I recollect a patient who came into my hands a number of years ago with large and frail teeth, very much crowded, and it appeared to me impossible to retain those sixth-year molars without doing the patient positive injury, and I had them extracted. But from the day those teeth were extracted the arch expanded, and within four years there were spaces between all the teeth in the mouth. I do not think I ever extracted a sixth-year molar in any other case where I really regretted it afterward. As Dr. Dodge has said, I have extracted not alone the sixth-year molars, but other teeth, for regulating purposes; I have extracted a lower central incisor, the lower lateral incisor, the superior cuspid and the superior lateral; and I think I have done the patient good service in so doing. But I am not here to advocate the extracting of teeth indiscriminately, nor the laying down of any rule for their extraction. There was a dentist a number of years ago who almost laid it down as a rule to extract all sixth-year molars. He did not care whether they were sound or unsound; he said there was more good done by extracting them than by retaining them.

This subject has been under discussion for as many years as I have been in practice, and I have observed by the journals published still further back that it was discussed at a much earlier day. We have every reason to believe that from this discussion we have arrived at a clearer understanding of the matter, but I think we shall be liable to err for a great while to come. Sometimes a patient comes with a first molar that is decayed and poorly organized, and it seems almost impossible to save it, while perhaps all the other teeth in the mouth are good. Another will come with one first molar pulpless, one with the pulp exposed, while the other two molars will perhaps be perfectly good. What are we to do in such cases? These are questions, gentlemen, which we can only answer



as they present themselves in practice. It appears to me impossible for anyone to lay down a rule which young men just coming into the practice of dentistry can follow with safety and feel that they have light enough to know when to extract and when not to extract. While I would not advocate the indiscriminate extraction of sixth-year molars, there are circumstances in which I would advise it. If I could preserve thirty-two teeth in the mouth I would be most happy to do it; but it is not always possible. One gentleman who has just left the room boasts of having thirty-two teeth in his mouth, and very well preserved. But I think there are very few such cases. I have two or three patients that come to my mind now who have thirty-two teeth. One of them, a gentleman about fifty years of age, has been under my care for the last ten years, and all I have had the pleasure of doing for him is to occasionally remove a little salivary calculus. He has not a tooth filled in his mouth. I am very much pleased with Dr. Brackett's and Dr. Dodge's papers. I think they are perfectly sound, and we can indorse them.

Dr. W. H. Atkinson. In the main I have only commendation for the papers that have been read and the remarks that have been made upon them, my regret being that we are following too much the orthodoxy of our elder sister, of general medicine; dealing in generalities; finding fault or commending without going deep enough into the subject to be entitled to judgment. What are the points now involved in this question that we ought to be masters of? It resolves itself into two questions: Will you have the original tissues that belong to the body preserved in good working condition; or are you well enough acquainted with the law of the evolution of the different parts of the body to decide that you will be better off when you have scar-tissue in some part of the body than you would be with the original tissue? There has been a great effort to discover and describe the qualities of scar-tissue and all that, and it is the gist of the trend of mental activity in all departments of medicine to-day.

What is our duty? I say to my boys when I have them in class before me, "When you don't know what to do, hold still and wait for developments; or if the case is of such urgency that you cannot dismiss it in that way, ask the best counsel that you can get." What is nutrition of a part, and how is it brought about? When we understand these foundation principles we will be entitled to formulate very short rules, so that a book of 150 pages will give us the cream of all we know about it. Then we can select a dozen real good, earnest dentists who will formulate a primer that shall stand forth as the guide of the world, and shall hold some relation to all the changes of the organism that constitute health and disease.

In regard to the question of extracting, I think I have pronounced myself sufficiently plain upon that for these many years. We ought to spend our time in asking questions, and then we would get at the real gist of the matter. There are circumstances in which it becomes my duty to extract the sixth-year molars, although they are my pets. If I had charge of the patient from early childhood I do not think I would ever extract. I cannot conceive of so meanly begotten a child that its teeth could not be trained to obey the type.

I expected to have a case to exhibit to-night where I had extracted the sixth-year molars by consent of my intellect but not of my affections. The sixth-year molars were largely erupted, beyond the range of the other teeth, and kept the mouth open beyond the normal occlusion. The child was then over thirteen years of age, I think, and the second molars were fully erupted. I extracted the sixth-year molars and the case did very well and was satisfactory. I have extracted a cuspid tooth, like Dr. Northrop, but I cannot say, as he did, that my conscience did not go back on it. I would not do it now. I think it is a sin.

Dr. Jarvie. I do not suppose there is any other sight so beautiful to the eye of the dentist as thirty-two teeth in the jaws, each one in its normal position; but unfortunately it is a sight that we rarely behold. We have to deal with mouths and with teeth as they are presented to us in practice, and the question in each case comes up, "What is the best to do in this particular case?" I do not think there is a gentleman in this room but would prefer that the thirty-two teeth shall be kept in the mouth provided they can be retained without injury to the patient. But that injury may be of various kinds. Thirty-two teeth may possibly be kept in the position that nature seems to have assigned them, all strong and well developed, but presenting such an irregular and uncouth appearance as to be very detractive to the personal appearance of the patient; and I think that in cases of that kind it is perfectly proper to extract one or even four teeth. I believe that twenty-eight teeth in regular and good position are better than thirty-two teeth presenting a crowded and unattractive appearance. Twenty-eight teeth moderately free from decay are very much better than thirty-two teeth that are continually presenting cavities to be filled, and which are a source of great suffering and expense to the patient. I think we are justified in many cases in extracting some of the teeth to secure a better arrangement and better preservation of the others. The burden of Dr. Davenport's paper seems to be that the extraction of teeth is very rarely justifiable. I have extracted almost every tooth in the mouth for regulating purposes; and I think I can present a case to Dr. Atkinson where he would say it

was perfectly proper to extract a cuspid. I remember one case where on one side of the mouth the cuspid, the lateral, and the central were in perfect position, and on the other side the central, lateral, and then the bicuspid, the bicuspid presenting to the casual observer the perfect appearance of a cuspid tooth. At twenty-eight years of age the cuspid made its appearance in the roof of the mouth. I extracted it, and I think Dr. Atkinson would have done the same under the circumstances. I think his illumination in that case would have been just the same as mine was. I do not remember having extracted a cuspid that was outside of the arch.

The burden of the discussion as to extraction to-night seems to have come upon the sixth-year molars. In my own experience I have frequently found it judicious to extract bicuspids. In cases where the teeth are large, the jaw small and there is a square, coarse look to the mouth, the extraction of a bicuspid on either side will allow the cuspids to drop in, and give a much more refined expression to the person. In such cases I think it is very much better to extract a bicuspid than a molar. In other cases I think it is extremely unwise to extract the first bicuspid. I have two cases where the bicuspids have been extracted to relieve a crowded condition of the teeth, and the condition in both cases is now very much worse than it was before the extraction. There has been a falling in, and apparently an absorption of the process to a very great extent. I think that where there is a tendency to a narrowing of the jaw the bicuspids should under no circumstances be extracted.

The ground has been very fully covered by Dr. Brackett's paper, in which he expressed my opinion on this subject very clearly.

Dr. Atkinson. I think we get our best judgments when we are in our highest illumination over our patients and in our inspired moods. Under such circumstances my illumination on one occasion was not to extract a cuspid that stood nearly in the center of the roof of the mouth. The patient, a lady, was a singer. Although she did marvelously well in her enunciation with such an obstruction, she desired to have it benefited. It was a right superior cuspid, and the lateral stood about midway between it and the line where it should stand, the centrals being in proper position. A fixture was made and the teeth brought into line, so that they were in good position, and without destroying any pulp. It was a complete success. I sent my bill, and to my surprise they said they did not owe me anything. I employed an attorney and went through with a suit at law, and had it referred to a referee, and they acknowledged everything I charged. You know that when you go to law you have to submit to that demoniac thing, the drawing of an estimate, and the whole tinkering and hokus-pokus of how you get at the



amount of your bill. They demanded an itemized bill; and they did not deny a single thing. They said it was right and the work was excellent, and that Dr. Atkinson had treated them like an angel. The judge said he could not find from my testimony, or from anybody else's testimony, that the lady's husband and myself had ever come in such contact as to constitute a contract; therefore I was not entitled to anything; and I had to pay three hundred dollars costs.

Dr. J. W. Clowes. I expect all these young men will come in and adopt this glorious practice of extracting the sixth-year molars. A dentist can do more good with one stroke on that point than he can with all his labors for a lifetime. Instead of being so afraid and so conservative on the subject, and making this practice exceptional, make it the general practice. There may be instances where it is not proper, but the general practice should be to extract the sixth-year molars, and do it at the right time. I have told this society many times how I manage this matter and how I cultivate the oral garden, but you talk about everything else and seem to forget what contact does to human teeth; contact among human teeth is dangerous always, and the sixth-year molar is the greatest mischief-maker in the human mouth.

Dr. Dwinelle. It is remarkable, Mr. President, how little the great Creator knew about making men, and especially about placing teeth in their mouths. It is remarkable that while He is so infinitely wise in all other respects He has failed so utterly in the matter of sixth-year molars, and put them into the human mouth to its great injury. It must be a subject of congratulation to us that Infinite Intelligence was inspired with the *afterthought* of creating and sending into the world a favored few, wiser than He, to correct His great mistake! However, I think we pretty well agree, both in regard to the papers read and the discussion generally this evening. They seem to be harmonious, although different at first sight. The conclusion seems to be—honest practice by common rules and common-sense. We vary our practice according to circumstances. As I suggested the night Dr. Davenport's paper was read, our practice should be eclectic. It is impossible to establish severe and arbitrary rules to govern all cases. The paper of Dr. Davenport I most thoroughly indorse. I think he is entitled to great credit for the labor, the research, the common-sense, and the science by which he has endowed his paper with such a high order of merit. I take pleasure in indorsing all that has been said to-night with reference to the retention of the sixth-year molars whenever it can be done judiciously; and I particularly deprecate the general and sweeping assertion that has just been made, and which I am sorry to say has been so repeatedly made by the same gentleman, that the sixth-year

molars *as a rule* should be extracted. I do not think that sentiment is indorsed by the profession, and I think our worthy friend will wait a great many years before he sees it so indorsed.

There was in my office to-night a case in point. A lady, under the advice of a person who ought to know better, for I gave him better instruction, had had removed an inferior sixth-year molar on the right side, although perfectly sound, because, as the dentist said, "it ought to be removed; sixth-year molars generally ought to be removed." He wanted, also, to take the others out, telling the lady that if they were removed they would be replaced by the wisdom-teeth. But unfortunately the wisdom-tooth that was to replace the molar he extracted never came in, and it never will. I asked the young lady what her age was; a very delicate question; and she said she was twenty-five. Very few maiden ladies ever get beyond that age, you know. A few hours afterward I asked her mother to tell me honestly, in the interests of science, how old her daughter was; for I was looking for *wisdom*. "Well," said the conscientious mother, "*in the interests of science*, my daughter is thirty-six." So there is no prospect of the wisdom-tooth coming in. The effect of that extraction is that the twelfth-year tooth has tipped forward, and simply articulates on a single point; the wisdom-tooth has not come in, and the articulation is entirely broken up on that side so far as the molars are concerned.

I would like to answer the questions that have been asked here to-night,—one by Dr. Northrop in a case where he felt constrained to extract a cuspid tooth in the right side of the superior jaw,—as to what should be done in such a case. I would say that under the circumstances I would sacrifice the lesser to the greater, which should be the rule all through our lives; I would extract the first bicuspid immediately under the cuspid, because the bicuspid is altogether inferior to the cuspid. The cuspid is one of the key-stones to the arch. The maxillæ are not perfect arches; they are sections of a parabola. The cuspids are the most important teeth in the mouth, not excepting the sixth-year molars. I remember to have extracted two cuspid teeth, several years ago, both of them tardy teeth, late in developing, and both in the superior maxillæ of mouths where there had not been any teeth visible in twenty years; in one instance twenty-five years. The patients had worn artificial dentures in both cases. Both the cuspids lay in the palatine arch; and nobody knew that they were there until the case was presented to me. In one instance the case was brought to me by my worthy friend, Dr. Lord. The patient in that case was Hon. Hiram Barney, then our collector of the port. He had been suffering from neuralgia; had exhausted the research and skill of all his medical friends, and

nobody could divine what the matter was. He was in great distress ; had not slept for seven nights and days. He was nearly insane, and was evidently rapidly succumbing to the great strain upon his nervous system. I looked into his mouth and discovered a prominence lying across the palatine arch, and on the instant I diagnosed that the whole trouble proceeded from a tardy tooth lying imbedded there. I told him my opinion, and got his faith and confidence. He wanted to know what course I would take. I told him I should dissect away the gum down to the bone ; cut this away and make an opening in such a way that I could extract the tooth. I did this literally, and the operation gave him instant and permanent relief. That is an instance where I was justified in extracting a cuspid. I had another case years before of a very similar character. A lady had the credit of having cancer of the superior maxilla, which had been toothless for years. The cancer was a tardy cuspid tooth, undeveloped and deeply imbedded, which I extracted. I am glad this question is up. We have discussed it long, and it is not settled yet.

Dr. Perry. I want to take a slight exception to the statement that has been made several times this evening, that it is so very uncommon to see thirty-two teeth in the jaws. I cannot say that that is my experience. I think I can show a very large number of mouths among patients whose teeth have been under my care since childhood which contain thirty-two teeth. Some have large fillings, and some have a great many of them, but many are without a dead pulp, and with all the thirty-two teeth in position. It has required a great deal of work on my part, and considerable expense to the fathers of the children ; but by the time they have reached the age of twenty years the dangerous time has passed, the hard work has been done, and with reasonable care the teeth can be kept nearly all through life. It is during childhood that the foundation must be laid for these complete dentures. I think it would be well to call the attention of the younger members of the profession to one point, and that is that they should not be discouraged with the sixth-year molars at six, eight, ten, or twelve years of age if they are soft and frail, or even considerably decayed ; for, by constant watchfulness and filling and re-filling with plastics, the time will come when they will be in such an improved condition that they may be permanently filled and preserved for many years. I learned that fact many years ago, from a case of a little girl whose sixth-year molars showed signs of rapid decay almost as soon as they came through the gum. I decided that they should come out when the child should have arrived at the age of twelve or thirteen years ; but I said I would do the best I could with them in the meantime by filling them with gutta-percha and oxychloride,—that was before



oxyphosphate was introduced. I did so, and carried them along until the child was eleven or twelve years of age, and by that time the condition of things had bettered so much that it came to be a question whether I should take the teeth out or not. Somebody has said, when you don't know what to do don't do anything, and I acted on that principle in this case. As time went on the teeth improved, and at thirteen I decided to leave them in, and to-day they are all in position, and the woman has a beautiful set of teeth although there are some pretty large fillings in the sixth-year molars. She takes good care of her teeth and comes to me regularly twice a year. Such cases seem to show that, although the sixth-year molars may be very bad in the beginning, if they are kept along with plastics nature will put them in a condition so that they can be worked upon a little later with a reasonable certainty of success.

The President. Gentlemen, I should like to make a few comments upon the remarks that have been made this evening. Dr. Jarvie says that thirty-two teeth are most beautiful to look at, but he thinks twenty-eight good ones are better than thirty-two that are tolerably bad. I most heartily agree with that sentiment. But, gentlemen, it is a very singular thing that the New York Odontological Society, at one of its meetings in 1887, should receive the most accurate and evident instruction from one of our English brothers on that very point. Of course it has not escaped the attention of any one of the gentlemen here that thirty-six was the original number. Now we have thirty-two; possibly to become twenty-eight. But what are the teeth that are being suppressed? Not the first, not the largest and strongest molars, but the third; the last teeth in the mouth, the last to come, often the first to go in the individual case, and the cases brought up by Dr. Dwinelle, which I might duplicate. I am very sorry to say, in my own practice, are cases which must come before us when we undertake to settle in our own minds what is best to be done. But Dr. Underwood hits the key-note squarely when he refers to the gradual disappearance of the third molar, noticed both upon the other side of the Atlantic and upon this.

The next one I want to speak of is Dr. Perry, who says that he does see thirty-two teeth every now and again. Yes, but Dr. Perry sees for the most part only his own patients.

Dr. Perry. I spoke in that connection more particularly of those whose teeth I had cared for from early childhood.

The President. The more honor to you. Those who have had the fortune or misfortune of seeing a great many of other people's patients have seen very few mouths with thirty-two teeth in them.

Now comes this question of extraction. Dr. Lord years ago advocated in some cases the breaking or cutting off of crowns, leav-

ing the roots. I thought about this theory for years before I saw the underlying reason for it; but I see a very good reason for it to-day.

Dr. Perry says that if we will but be patient with the sixth-year molars until they have arrived at a certain age we will be gratified with the excellent results we shall see. Most heartily do I agree with him in that remark. And I will say once more what has been said before in this society, but I do not think it has been much acted upon,—that in palladium we have a most admirable filling for such teeth. It sets as quickly as oxyphosphate of zinc, is as hard and dense as copper, and is unshrinkable.

Dr. Clowes. And as black as your hat.

The President. Yes, as black as my hat. It is one of the most important materials for prompt and immediate contouring that we can get, and I think it is at the present moment the most valuable filling-material with which I am acquainted. Unfortunately, it costs about forty-five dollars an ounce—much more than gold. It requires to be carefully weighed and most rapidly manipulated. It is used in the form of an amalgam. Those who are acquainted with Fletcher's balance will remember that a certain quantity of mercury is placed in the long arm of the balance and a balancing quantity of filings in the short arm. By reversing that process for palladium, we will have about seventy-five per cent. of mercury to twenty-five per cent. of the precipitate, and it will give nearly the proportions that can be used; hence we may use palladium at about half or less the cost of gold. The main objections to it are its hardness and its color. I have found it a most valuable material for filling children's teeth and for making amalgam contours. The fillings will not coalesce as the teeth are again brought together. It is under control, and it may be made to harden in three seconds or in half a minute.

Dr. Perry. Have you had very satisfactory experience with copper amalgam in making contours, etc.?

The President. Some of my experience with it has been satisfactory, and some has not.

Dr. Perry. What is the weak point?

The President. There are certain copper amalgams—I do not know which ones—that seem to wash out, and therefore have a certain degree of uncertainty. They are not of uniform hardness. One seems to have a great deal more mercury in construction than others. Three pieces cut from the same bar will vary in the degree of their hardness; one piece will be so soft that the mercury will ooze out, and the second piece will be so hard that it cannot be used.

Dr. Perry. Have you used it in combination with other amalgams?

The President. Since Dr. Flagg suggested it I have so used it once.

Dr. Perry. With what result?

The President. I do not know. I have not had the opportunity to examine it.

Touching Dr. Brackett's paper and Dr. Atkinson's criticisms upon it, Dr. Brackett says we should use judgment. Well, that is a remark which is trite, but it seems to me that our judgment must be founded on knowledge before it can be valuable. If we know by observations of dental development what causes disease and what prevents it, our judgment is of value; otherwise it is very much like guess-work. I could not help having the question come to me, Why do we ever extract teeth? There must be a reason before we would consent to amputation or extraction; and the answer to that question is not so clear to my mind. There are cases, yes; but those cases are very few. Sometimes it is said that we should extract to get room; sometimes because the teeth are crowded. I will not deny that those conditions exist; but I recollect just now a young gentleman, whose name would be known to everyone in the room, who at twelve years of age had the sixth-year molars extracted. To-day no dentist who had not carefully studied the anatomy of the teeth could tell that any tooth had been extracted. The twelfth-year molars seem to be the size of the sixth-year molars; and the wisdom-teeth are fully developed. It is a beautiful arrangement, and the articulation is as handsome as almost any I have ever seen. But the young man is but twenty-three or twenty-four years of age, and between almost every two teeth in his mouth are approximal cavities. It is almost impossible to pass waxed silk between his teeth. The wear on his incisors, both above and below, is as great, it seems to me, as should be found in the teeth of a man of fifty. What causes that? The extraction of the first molar above has allowed the convexity of the arch to become almost a straight line. The extraction of the first molars below has permitted the concavity of the arch to become nearly a straight line. The molars behind have changed their position in such a way that the bite is shortened. The lower incisors are brought against the upper incisors as they never should be at that age, and the tendency is present in his mouth to have the upper central incisors spread apart.

Dr. Perry. And that will increase as he grows in years.

The President. Certainly. So, to come back to it, I do not know on what general rule teeth should ever be extracted. Now, why should they be preserved? First and foremost, I think Dr. Davenport has given us a good reason,—the articulation of the surfaces in such fashion that we may get not only a chopping motion of the jaw, but a lateral motion also. And I shall be delighted to show a



cast which I have where the grinding operation is very evident, and where the cusps of the teeth, had they irregularly antagonized would have utterly prevented that grinding motion. Secondly, it seems to me they should be preserved because proper contact of two teeth preserves them in health by preventing accumulations of food between them. Disturb the position of two teeth standing side by side, and allow them to lean against each other, and you have that condition of things which has been said never could exist—namely, decay of the cementum. Time and again I have seen the cement decayed under the gums of teeth in that position, while I have never seen such a condition existing when the teeth stood in their normal positions side by side and nearly erect. A third reason, and a lesser one, would be their appearance. A book has been published in the medical world, entitled "Filth Diseases." In that publication are enumerated cholera, typhoid, diphtheria, and almost all contagious diseases. Now comes the question, Is not decay of the teeth another? We are all well aware that the hair and the enamel of the teeth are the most persistent of human structures. I asked Dr. J. Foster Flagg the other day this question: "Suppose a tooth were presented to you which had erupted with a lot of defects in its enamel covering. Do you or do you not think that, if those defects could be immediately corrected,—that is, those little openings filled with some indestructible substance so that the covering of the tooth was once more rendered complete,—it would be in just as good condition to last for a lifetime as though those defects had never existed?" He answered without any hesitancy, "Yes, I think the tooth would last." And I must say it has seemed to me from the records I have kept that it would. I do not need to look more than ten feet away for confirmation in regard to one rather peculiar case where I hesitated for years whether I should extract,—a case where the teeth were decayed very extensively, and I had to use plastics to keep the sixth-year molars along. At last I attempted to fill them permanently. When finished, I sent the patient to Dr. Atkinson for his judgment as to what had been done. Two years and a half passed, and I never saw the boy. He then came to me in Paris. I had one sitting with him there, and he left my hands with his teeth in as good order, I think, as when Dr. Atkinson saw him. I did nothing more for him until this year, when he came to me with his wisdom-teeth erupted. I had three or four sittings with him, to make a few small repairs, and to fill these newly-erupted wisdom-teeth, all trifling operations.

This is a case where the defects were in every direction,—approximal decay, interstitial decay, right and left, and the teeth frail as we call them; yet the protection seems to have been complete. He does keep the gum hard and firm by thorough cleansing, thereby

preventing mostly the deposition of tartar and preventing further decay. So the question arises, If the extraction of teeth is for the purpose of getting room, and thereby preserving those that are left, do we get room long enough to pay for the damage we do? The teeth that most need extraction for that reason are the ones that will least stand it, for they are the long, narrow teeth that are prone to decay; and as Dr Davenport has very accurately shown, we have but to wait a few years and contact is sure. Please understand that I do not mean contact between all the teeth in the lower jaw is sure, because it may happen that an upper tooth will come down in the articulation between two lower teeth, but wherever they are not held apart by some mechanical means they will come together; and their second contact is invariably worse than the first.

I beg your pardon for taking so much of your time, but it seems to me that this is a subject of the utmost consequence to dentists; and it seems to me further that we should not allow this question, which we never have had up in this form before, to degenerate in the least degree into a question of economics. That is a question to be settled between ourselves and our patients; but it is for us to settle between ourselves what is the best thing to be done; money, time, and trouble out of the question. This is a matter of great consequence to us and to our society.

Before sitting down I wish to make my sincere thanks to the members of this society and to the visitors who have assisted us so heartily and so efficiently this year. This is our last meeting before autumn, and I do not suppose I shall have the pleasure of meeting you all again. Therefore, I take this opportunity of making my personal acknowledgments for your kindness and consideration toward me. Furthermore, I venture to express the hope that our Executive Committee will see fit to continue this subject still further, for I know personally of three at least who would be glad to further discuss it, and other expressions have been dropped this evening showing that investigations are on foot, and casts being made, and thoughts had that will, I have no doubt, be of value to us.

Dr. Dwinelle. I trust that the suggestion will be adopted. I have a number of models myself which I should like to bring, and I know of others who have.

The society adopted a resolution which had for its object the raising of funds for the defense of dentists who might be sued by certain patentees of alleged improvements in dentistry.

The same resolution has been published in the journals, having previously been adopted by the First District and other societies.

Adjourned.

S. E. DAVENPORT, D.D.S., M.D.S.,  
*Editor N. Y. Odont. Society.*

## FIRST DISTRICT DENTAL SOCIETY, STATE OF NEW YORK.

THE First District Dental Society of the State of New York held a regular monthly meeting, Tuesday evening, May 3, 1887, in the rooms of The S. S. White Dental Manufacturing Company, Broadway and Thirty-second street.

The president, Dr. W. W. Walker, in the chair.

The following report of the Clinic Committee was read by Dr. Wm. H. Atkinson:

Mr. President and Gentlemen: There was a very interesting clinic this afternoon, at which some ninety dentists were present. . . . Dr. J. M. Crowell, of New York, demonstrated his methods of making crowns, caps, and ferrules without an impression after the following manner: The root to be crowned is first measured with calipers, and a blank tooth of corresponding size, cut from plaster models of natural teeth, is taken, trimmed as required, and platinum wire wound closely around it to form the ferrule. A cap struck up from dies is then made to cover the end of the blank, and gold flowed over all to complete the crown. It is afterwards filed up to fit the case, or may be covered with gold body and enamel. . . . Dr. J. Gardiner Morey, of New York, made a crown as follows: An impression of the root to be crowned was taken in very hard white wax, thus forcing back the loose gum; from this a plaster cast and an impression in a material looking like putty were made; over the last was placed a ring of rubber, and in it a small funnel to give proper shape to the lower part of the die, which was cast of fusible metal poured into the ring. The cap was made by striking the die on gold held on a soft piece of lead, after the manner of Drs. Brown, Evans, and others. . . . Dr. Starr, of The S. S. White Company, exhibited a series of charts designed by him showing profile and sectional views of natural teeth, and giving, as Dr. Starr expressed it, the "plumb-line from the crown to the apex of the root." Dr. Starr also struck-up cusps or caps to be used in connection with the seamless collars. He had a hard brass plate which contained a complete set of molds. A cap is formed from gold plate of No. 28, standard gauge, by placing it upon the mold desired and striking upon it with a plug of soft solder, in the same manner that "hubbing" is done at the United States Mint. The caps thus formed may be soldered to the seamless collars and crowns of any desired length made. These molds, I understand, are on sale at The S. S. White Dental Manufacturing Co.'s depots. . . . Dr. O. E. Peck, of Morristown, N. J., exhibited what appeared to be a gold filling in an artificial tooth, which was made by burnishing a piece of eighteen-carat gold into a depression ground into the porcelain tooth, a small portion extending through



between the teeth into the rubber to hold it in place. . . . Dr. Gaylord, of New Haven, showed casts of a case wherein the centrals were being forced apart, induced by the extraction of the sixth-year molars. . . . Dr. J. A. Kimball, of New York, exhibited a very ingenious mandrel for carrying sand-paper disks, the parts to which are non-separable, thus preventing the annoyance caused by having to remove the screw in replacing a disk. For use in connection with this mandrel is made a special disk, having a T slot into which the head of the mandrel is slid, and the disk fastened by a nut which slides on the body of the mandrel. . . . Dr. Evans showed a piece of bridge-work, and demonstrated a method whereby the same could be repaired without removing it from the mouth.

#### INCIDENTS OF OFFICE PRACTICE.

Dr. S. C. G. Watkins, of Mont Clair, N. J., stated that the annoyance of having stoppers of either cork or glass stick in varnish-bottles may be entirely prevented by applying to the stopper a little glycerin whenever the varnish is used.

Dr. Atkinson. Mr. President, I have an incident of office practice that clinches what I have endeavored to promulgate ever since I have been a public speaker to dentists. It is a case of necrosis of the right side of the inferior maxilla, that was treated in Philadelphia, in four distinct operations, by the man that I call the best oral surgeon living, Dr. J. E. Garretson, and it is not well yet. The patient was sent to me by Dr. Merritt, of Jersey City. Her condition was pitiable indeed. She was very pale, anemic, and the skin was just ready to burst on the right side of the face with a fistula large enough to admit your little finger. The operation had been made by slitting the soft tissues at the median line, cutting along the base up to the ramus of the jaw, and lifting up and extirpating a so-called osteo-sarcoma. I found new bone formed on the exterior portion, and pretty well organized; but the hard part of the bone, as the ramus rises to constitute the coronoid process, is necrosed; and yet it is not what is generally understood as necrosis. The instructors in this field of labor have failed to define the difference between a case of caries and one of necrosis. All caries is necrosis, but it means superficial necrosis. This case is neither one nor the other; it is deep-seated caries in the hard part of the bone; and yet there is no line of demarkation set up between the living and the dead bone. An operation will have to be performed. I put the patient upon tonic treatment. I washed out the cavity with peroxide of hydrogen until it ceased to bubble, and then washed it thoroughly with potassa mercuric iodide, one grain to six ounces of

water, which is said to be more efficient than the bichloride of mercury at one grain to the ounce. I used about two ounces to each charge. I was afraid that it would burst through the cheek. It was reported to be a case of salivary fistula; but it was more than that. I was in doubt whether it was an osteo-sarcoma; but there was abundance of embryonal tissue, so bloodless as to look almost like a gelatinous polypus. I put in the dressing so as to enlarge both the external and internal portions, and put the patient upon tonic treatment. I gave her American port wine. That was on Friday. On Saturday she came in and said she had been suffering very much all night. As soon as the plug was removed and the discharge escaped the tension was off, and the great intensity of the pain was relieved. I repeated the dressing twice that day, twice on Sunday, and twice to-day. There is scarcely any discharge now, and I can carry an instrument to the seat of the trouble, causing very little pain.

The instruction for us in this case is this, that we should be like Davy Crockett, sure we are right, and then go ahead; not diagnose cases six months in advance, but take them as they are; see that we get a *status quo*, and then take a step at a time.

One other word of instruction,—for I may not always be with you to tell you these things from a warm heart and a keen-cut intellect, that knows where the difficulty is by having met it so many times: It is not to assume too much, but take steps along gradually. Be a little sweet, but at the same time in every way independent about the case in hand. It was suggested that somebody else should have control of the constitutional treatment of this case,—some learned doctor; and I said, "Oh, yes, fetch all the doctors you want; I am glad to have them here; but we must discuss the questions before the patient; let the doctors say what they have to say, and then be examined by everyone present; but no dictum, no saying, 'You shall not go this way or that.' Give me control of the case, or let somebody else take it." If you once take that stand, you will have done much to illuminate your patient and make your practice easy.

Dr. W. Irving Thayer, of Brooklyn, N. Y., read a paper entitled "The Adjunctive Condition of Dentistry," which was discussed by Drs. E. Parmly Brown, W. H. Atkinson, and N. W. Kingsley.

Adjourned.

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The Society held a regular monthly meeting, Tuesday evening, June 7, 1887, in the rooms of The S. S. White Dental Manufacturing Company, Broadway and Thirty-second street.

The president, Dr. W. W. Walker, in the chair.

Dr. W. H. Atkinson, chairman of the Clinic Committee, read the following report:

Mr. President and Gentlemen: There were present over one hundred dentists at the clinic to-day,—a very unusual number for this season of the year. . . . Dr. B. A. R. Ottolengui, of New York, set a Logan crown, using his new root-reamers and trimmers, which worked very satisfactorily. (For description of these instruments, see the June number of the DENTAL COSMOS). . . . Dr. Starr continued his clinic of last month, making crowns and cusps by swaging gold in a hard-metal die. Dr. Starr used the Knapp nitrous-oxide blow-pipe, melting scraps of gold on charcoal, when it assumes a globular form. These nuggets were driven into the dies, forming solid cusps of 18-carat gold, which are used in conjunction with the seamless collars for completing the crown. Crowns were also struck from gold, the inner surface being covered with platinum,—this form of gold being very convenient where it is necessary to reinforce the cusps with solder. . . . A new automatic mallet, the invention of Dr. Frank Abbott, was exhibited, the peculiarity of which is that it has a pull blow, which enables the operator to give a blow on the posterior as well as on the usual surfaces of a tooth. By a cushion on the spring the usual click and ring are largely overcome. . . . Dr. W. H. Mitchell, of Bergen Point, N. J., operated his new engine mallet. It can be used as an automatic mallet or attached to the engine, or the automatic stroke of a hand mallet can be obtained without detaching it from the engine. The blow is very similar to the electric mallet. The doctor also presented to the profession a new local anesthetic which he called Steno-carpine. . . . Dr. C. E. Brooks, of Brooklyn, showed an articulating paste to be used in grinding teeth when fitting them in the mouth. It is a dark substance, and acts on the same principle as the articulating paper we have been accustomed to use. I inquired of what it was composed, and there seemed to be some reticency or lack of knowledge on the subject. When the gentleman who manufactures it was asked if the coloring-matter was carbon, he said it was, and that it was entirely innocuous. If it is carbon it is innocuous. . . . Dr. E. Parmlly Brown, of Flushing, exhibited some bridge-work where the platinum bar uniting the crowns was covered with enamel body and fused in a furnace. Plate teeth are selected for the purpose, the straight pins of which are bent over the platinum wire and covered with the body, the platinum wire being long enough to form the pins which anchor the piece at the ends. Where several teeth constitute the support for the bridge, one or more pins are inserted at proper intervals to make it more secure. Dr. Brown claims for his bridge-work strength and durability. It is certainly very natural in



appearance. . . . Dr. S. C. G. Watkins, of Mont Clair, N. J., showed models of a regulating case which he had previously asked advice upon, and which now shows the result of his work upon it. Dr. Watkins will give a full description of it under "Incidents of Office Practice." . . . I presented a case, which is an instructive one, where a gentleman had been advised to have his teeth broken off and an artificial set placed over them, he having stated that his teeth were very difficult to extract, being held so tightly in the jaw. He was not satisfied with the advice, and was sent by his physician to me: I have not the casts of the mouth here, or I would present them; but in the absence of the casts I will state that the left superior central incisor was very largely decayed, and filled quite poorly with oxyphosphate cement, but sufficiently well to arrest the rapid progress of decay and leave the tooth in a tolerable condition. The molars were all gone on the left side below, and both bicuspid and two molars on the same side above. The first and second bicuspid were broken off, leaving sharp margins on the right inferior side of the mouth, and the first molar standing and in good condition; the second molar broken off in like manner with the bicuspid, and the outer face of the third molar split off, exposing the pulp. That tooth had been filled with oxyphosphate, and so well done that I did not remove it down to the pulp. The mode of procedure was to set Logan crowns on the bicuspid on the right side below, and to band the roots, which had been prepared and filled, of the second molar below. Both the first and second molars on the right side above were gone; the second bicuspid was pulpless and filled with amalgam; the third molar was decayed on the anterior face and the grinding surface pit, the anterior face having been filled with amalgam. I took a pair of bicuspid, which, by reason of the distance between the pulpless bicuspid and the third molar, just fitted the space, and put on a backing, leaving tenons extending forward into slots cut in the amalgam filling in the bicuspid; cut through the approximal and grinding-surface fillings of the third molar; packed the bottoms of these cavities with 120 gold so as to secure them against leakage, and wrapped the bars with 120 gold until they were thick enough to be just forced down into position, and so that the occlusion was right. I then filled on the sides with 120 gold; getting the case in condition to be exhibited this afternoon at the clinic; and it was exhibited. I got through about one o'clock, and the patient went and ate his dinner, and he said he had not had so much comfort in eating since his teeth were broken off until then. He left the city in that condition, the left side of the mouth not being provided with chewing apparatus. The feature that makes the case interesting is the fact that the gentleman is a very bad dys-

peptic, and was supposed to be a consumptive. He got into the hands of Dr. Salsbury, who had been treating him for the last six months, not allowing him to eat anything but chopped lean beef and water. His blood is in very fine condition, his cough is gone, and he feels stronger, but is not very fat. The point that I want to make is the hasty way in which some dentists of very fine ability give advice to patients about the breaking off of the teeth; then setting artificial teeth all around, although having many good teeth in the mouth. I think that to be very reprehensible. I know that the gentleman who gave that advice is a competent operator, as far as filling teeth is concerned, but he certainly does not appreciate the advantage of natural teeth. He is not a histologist, he is not a physiologist, and he is not a very fine mechanician, although he fills teeth well. I wish to call attention to this to awaken the consciences of the brethren to the importance of being careful about giving immature advice to patients, who from their own common-sense will not submit to the practice advised.

[Dr. Geo. F. Reese, of Brooklyn, N. Y., showed some specimens of cancerous growths removed by strangulation, the report of which we have been compelled to lay over for want of room.]

#### INCIDENTS OF OFFICE PRACTICE.

President Walker. Gentlemen, Dr. Mitchell, of Bergen Point, N. J., is with us this evening, and will report more in detail upon the anesthetic to which Dr. Atkinson referred in his report.

Dr. W. H. Mitchell. Mr. President, this local anesthetic, known as Steno-carpine, was brought to my attention by Allan W. Seward, M.D., of Bergen Point. It was first discovered by a veterinary surgeon of New Orleans. It is derived from a bush known as the Tanblanket, a species of the acacia-tree. This veterinary surgeon has used it with exceedingly good effect in operating upon the fetlocks of horses. Some of the leaves were given to Dr. Seward, from which he obtained its alkaloid. One pound of the leaves produces thirty grains of the alkaloid. This alkaloid he uses in solution the same as cocaine is used, one grain to the drachm. Hypodermically he uses five drops, or one-twelfth of a grain, which he claims is in its anesthetic effect equal to one grain of cocaine. It seems to be harmless when so administered; no irritation is produced, and no abscess follows. In experimenting, I believe he has killed a nine-months-old dog with one grain administered internally. I have not tried it upon sensitive dentine, but I have saturated a bit of cotton with it and laid it upon the surface around a second molar, and then extracted the tooth without any pain whatever. We shall make other experiments with it and report.

Dr. S. C. G. Watkins. Mr. President and Gentlemen: I would like to show you this evening the models of a case of regulating which I exhibited here two months since and asked advice upon. The lower teeth projected beyond the upper ones so that half of the upper teeth were covered by the lower ones when the mouth was closed. The upper teeth were forced out by cotton-tape wedging, beginning with a single thickness between the cuspid teeth, and every other day increasing by one thickness until three or four thicknesses were inserted at once. I then let it rest a week to give the teeth a chance to get over their soreness; then went on with the wedging again. I was about three weeks in getting in eight thicknesses of the tape wedging. In that way the arch was spread so that the upper teeth extended beyond the lower ones, without touching the lower ones at all; and this was done without using any plate, ligature, spring, or any other fixture applied to the upper jaw, but merely with cotton-tape wedges. After I had carried the upper teeth out beyond the lower ones, I made a retaining-plate to hold them in position; then made a little fixture consisting simply of a gold band around the first lower molar, with a platino-iridium bar running across from one molar to the other, and attached rubber ligatures reaching from that bar to each of the six front teeth in the lower jaw, for the purpose of drawing in those lower teeth. In about ten days they were drawn in sufficiently; and I then trimmed away the retaining-plate on the inside around the necks of the teeth so as to allow the upper teeth to drop into their proper positions relative to the lower teeth. They are now in good position, except the two left upper bicuspids, which will be in their proper places in a few days. The regulating was done in about one month; and I think on examination of these models you will decide that it was quite successful.

Dr. B. A. R. Ottolengui was then called upon to describe a case of replantation of a deciduous molar, and read as follows:

Mr. President and Gentlemen: I would respectfully submit to your consideration the following description and history of a case which recently passed under my professional care. I am not positive that it is entirely new, but I believe there are aspects sufficiently novel and rare to warrant me in reporting it.

The patient is a lady, aged twenty-three, and enjoying apparently robust health. She was first seen on May 10, when she complained of a severe pain in a left inferior molar. Examination showed this to be a deciduous tooth, three permanent molars and but one bicuspid being present. The pain was positively located by the patient as in the tooth mentioned, although no response was made to tapping and other customary methods of examination. There was, however, a large stopping of amalgam occupying the distal and part of



the crown surface. This was in a leaky condition, and was at once removed in the expectation of finding some explanation of the trouble below. The stopping out, it seemed plain that calcification of the pulp had occurred. Believing that this condition might be only superficial, the drill was used in the endeavor to find any sensibility that might be in existence. I well knew that this was a tooth which in the natural order of things should have been lost years before, and I thought it reasonable to expect absorption of the roots, and that there was no pulp present; but, on the other hand the tooth seemed quite as firm as the neighboring permanent members, and I felt it safer to treat as though I were dealing with a permanent tooth. In other words, as it was an anomaly for it to be present at all, it was possible that full roots and pulps, at least in the canals, might also exist. However, working carefully, I drilled to such a depth, without finding the least trace of pulp or entrance to canals, that at length I was obliged to face the possibility of the drill passing through the tooth entirely. After a moment's consideration, and in face of the fact that, while I was no nearer the solution than at the outset, the result of my work had been to cause pain, I determined to intentionally drill through the tooth, and then if possible ascertain if there was a permanent bicuspid below; for I fancied that the pain might be caused by a coming bicuspid pressing against the recalcitrant temporary molar. The drill having passed through, there was a slight flow of blood, and I was unable to determine with a probe whether a second tooth were present or not, though the fact that I could not demonstrate its presence in this way would be but negative evidence that it was absent. The pain continued very severe, and in this dilemma I proposed to my patient the removal of the tooth, with the understanding that, should I determine on such a course subsequently, she would submit to my replacing it in its socket. She readily consented, and I will here say that the fact that the lady is a professional nurse, making a specialty of surgical cases, was to my mind a point very much in favor of the course I meant to pursue. The tooth was carefully removed, and it at once became evident that there was no tooth approaching, and that there had been no absorption of the roots. Examination of the tooth itself showed that there was calcification of the pulp from pulp-chamber to foramen. A very slight periosteal membrane was present, but so thin that no blood adhered to the roots after removal. Another point of interest, perhaps, is that the roots appeared semi-transparent, so that the calcification in the canals could be seen through the roots. A peculiar greenish or yellowish color prevailed.

I concluded to attempt the return of the tooth, although from the condition of the roots I felt doubtful of success. I hardly think

I should have so decided were it not for the vocation of the patient and the certainty I felt that there would be absolute obedience to instructions and an entire absence of nervous symptoms.

The course decided on, I proceeded to fill the tooth, no effort being made to enter the canals either in the usual way or through the foramen. The cavity in the distal and crown surfaces being large, and wishing that it should be filled ultimately with gold, and not having the time to do so at that sitting, I filled it with oxyphosphate. I realized, however, that the filling would rest against the process at the point between the roots where the drill-hole had been made, and therefore, before inserting the plastic filling-material, I filled this opening as follows: I placed a ball-burnisher between the roots, and then from within impacted No. 60 gold foil against the burnisher, thus securing a smooth surface to overlie the process.

The next step was to return the tooth to its place, and here an unexpected complication met me. The roots were very diverging, and though I had been able to remove the tooth whole, in that operation the leverage of the diverging roots was in my favor, the narrow edge of the wedge as it were assisting; but to replace it was a totally different affair, and after many attempts, during which my patient behaved most courageously, I was almost tempted to give it up. However, I determined on one more effort, and this was successful, although I was obliged in the first place to excise nearly one-third of the anterior root, and even then to drive the tooth into position with the aid of a mallet.

The tooth was not tied in in any way, and the subsequent treatment was as follows: First, simple dressings of Pond's extract of witch-hazel; on the same night the pain was so great that the dressing was changed, and chloroform and opium substituted, with good effect. The second day the witch-hazel was kept on constantly, and also on the third. Matters progressed so well that my patient became a trifle careless and in closing the mouth struck the tooth a blow which resulted rather painfully. During that night she suffered so much that morphia was administered internally, and produced sleep. After that everything was favorable, and without special attention the tooth has gradually become more and more firm, until at this time it is almost a certainty that it will remain in place, though I shall not disturb it by inserting the gold filling for some months.

I consider this an interesting case, as demonstrating that the temporary teeth may be replanted as well as the permanent, and such knowledge may be valuable in cases where children loosen their teeth from a fall or a blow, as well as in cases more nearly allied to the one under consideration. As to the cause of the pain the patient complained of when she first came to me, I must confess that that point even now is not clear to me. It may be that there was some

periosteal trouble, in which case it was perhaps providential that I should have accidentally been led to excise a part of the root. At least I can say that the pain has not recurred.

The calcification of the pulp is a matter of interest. On this point I make the following calculation: A temporary tooth in the mouth of a person aged twenty-three has existed about twice as long as nature intended. Taking forty-five as the average age of man, a temporary tooth at the age of twenty-three is proportionately as old as a permanent tooth at ninety. Thus, it may be said that this tooth has reached extreme old age, and that here is an instance of a tooth which, commencing as a pulp, has been retained long enough for the entire calcification of the pulp to have occurred, the process going on from without inwards.

Dr. A. L. Northrop offered the following preamble and resolutions: [See the DENTAL COSMOS for July, 1887, page 461.]

Dr. A. M. Dudley, of Salem, Mass., read a paper entitled "Chinese Dentistry," and exhibited numerous specimens.

Dr. W. H. Atkinson moved a vote of thanks to Dr. Dudley for his well-prepared and instructive paper.

Dr. Frank Abbott. Mr. President, feeling that some action should be taken by this society in reference to the meeting of the International Medical Congress, which is to take place in September, and as this is our last meeting before that time, I would like to offer the following resolution: [See the DENTAL COSMOS for August, 1887, page 510.]

The resolution was adopted without dissent.

Adjourned.

B. C. NASH, D.D.S., *Secretary*

### PENNSYLVANIA STATE DENTAL SOCIETY.

THE nineteenth annual meeting of the Pennsylvania State Dental Society was held at Glen Summit, Pa., June 26 to 28, 1887. The following officers were elected for the ensuing year: W. F. Fundenberg, president; W. E. Van Orsdel, first vice-president; Louis Jack, second vice-president; Wm. B. Miller, recording secretary; J. R. C. Ward, assistant secretary; P. K. Filbert, corresponding secretary; L. Ashley Faught, treasurer; S. H. Guilford, chairman of executive committee; G. L. Robb, chairman board of censors.

The next annual meeting will be held in Philadelphia, on the first Tuesday in June, 1888.

P. K. FILBERT, *Cor. Sec.*,  
Pottsville, Pa.



### WISCONSIN STATE DENTAL SOCIETY.

At the annual meeting of the Wisconsin State Dental Society, held in Milwaukee, July 19-21, 1887, the following officers were elected: W. F. Lewis, president; C. C. Southwell, first vice-president; F. L. Dolbeare, second vice-president; W. S. Sullivan, secretary; and B. Douglass, treasurer.

The next meeting will be held in Milwaukee, commencing on the third Tuesday in July, 1888.

W. S. SULLIVAN, *Secretary*,  
Madison, Wis.

### CENTRAL ILLINOIS DENTAL SOCIETY.

The sixth annual meeting of the Central Illinois Dental Society will be held at Springfield, Ill., October 11 and 12, 1887.

A cordial invitation is extended to all to attend this meeting and take part in the discussions.

W. A. JOHNSTON, *Secretary*,  
Peoria, Ill.

### WESTERN DISTRICT DENTAL SOCIETY OF ILLINOIS.

The second annual meeting of the Western District Dental Society of Illinois will convene at Macomb, Ill., on the third Tuesday of October, 1887, and continue for two days.

Great preparations are being made for fine clinics, and all dentists are cordially invited to attend.

R. W. BAILEY, D.D.S., *Secretary*,  
Macomb, Ill.

## HINTS AND QUERIES.

TO THE EDITOR OF THE DENTAL COSMOS:

Who will offer a suggestion in the following case? Mrs. P., a lady about thirty-five years of age, anemic, and a sufferer from sick headache, came to me with an abscess opening over the superior left lateral incisor. None of the teeth were decayed except this one and the adjoining cuspid. This cuspid had given much trouble until the root was filled several years ago. It contained a large gold filling, and a scar over the root showed that an abscess had existed there. The lateral had also a large gold filling, and pus followed quite freely from the opening over the root when pressure was made in the roof of the mouth. These teeth were not sensitive to percussion, nor loose, nor did she complain of them, but of the left *central*, which was not decayed, discolored, nor loose, but sensitive, and she believed the bone around it was diseased. I could see no indication of dead bone. The trouble had been the same for about two years, she said, only the pain would be quite severe at times, and the lip and cheek would be swollen. I extracted the lateral. The root had not been filled. I cleaned it perfectly, and, filling it with gold, replaced it. The pus continuing to flow, I injected solutions of chloride and carbolic acid. After two or three weeks the pus disappeared and the tooth became firm, the gums looking healthy though pale.

Since replanting the tooth there has been no severe pain and no swelling, until two or three days since, when there was a throbbing pain, and, she thought, a slight swelling of the gum over the incisors. This throbbing pain is frequently experienced after sitting in a cold draught of air, and seems to commence at the central, which is as sensitive as ever. Sometimes there is a peculiar darting pain about these teeth, and again at times the whole jaw will ache. What can cause this continued trouble?—C. H. THORN, Brownsville, Texas.

TO THE EDITOR OF THE DENTAL COSMOS:

When Dr. Bogue presented before the New York Odontological Society the Dr. Colignon case, of teeth regulated for a thirteen-year old girl, I thought it possible that the theory advanced by Dr. W. H. Barrett, in the August number of the DENTAL COSMOS might be correct. Thus a gradual change in the position of the teeth in the jaw would modify the occlusion without the actual moving forward of the lower jaw. But I have now under my care a boy of fourteen whose superior cuspids were prominent and the incisors inside their correct arch, though outside of the lower incisors, much like Dr. Barrett's case. Now, if Dr. Barrett had but first used the plate thickened at the impingement of the lower incisors, I think he would have seen the bite jumped suddenly just as in Dr. Colignon's and my own case, for I found the bite jumped immediately as a necessity in the act of masticating upon the plate. Upon taking out the plate, the boy would again close the teeth one tooth further back than normal. When the cuspids had been brought well down and within the arch, and the maxillæ at the bicuspid slightly spread, while the incisors were still too far back, there came an unexpected delay of over six weeks, at the end of which time matters stood just the same. With the plate in position the bite was jumped, but with the plate out the boy could still close the teeth one tooth too far back; showing that there was no change in the position of the lower teeth, but an actual movement backward and forward of the lower jaw.—F. A. ROY.

REPLY to A. A. H., "Hints and Queries" for August, 1887:

Select your cup, somewhat larger than a hard mouth would require. Use soft wax for your first impression. Stick the wax to your cup, and when cold, cut with knife and spatula a deep groove, into which the softer portion of the gum can depend without being disturbed when the cup is next inserted. Leave your wax ridge quite high all around, and, if the roof is hard, have the wax in the impression sufficiently high at that point to press the roof gently. Such a cup you will be able to hold up firmly and steadily, bearing only opposite the cheeks, lips, and at the center, while the soft gum will hang undisturbed in the hardening plaster, which I prefer to use as hard as can be inserted without pressing the soft tissues out of place.—J. L. D.

REMOVING PLASTER FROM VULCANITE PLATES.—It is the common practice to pack and vulcanize directly upon the plaster model, without the interposition of sheet lead, or tin, or any coating or varnish, as for instance the silicate of soda, and when the former method is pursued the plaster is found to stick fast in all the rugæ marks or other depressions in the roof side of the plate, and consume considerable time in the process of picking and brushing it out. Years ago I had such a plate under the hydrant for preliminary washing, and was abruptly called off, leaving the water running. Half an hour afterward I returned to find the palatal portion of the plate perfectly free from plaster; and, taking the hint, I have ever since allowed a little stream of falling water to do that work for me while I should be otherwise employed.—SUMNER FERNALD, D.D.S., Portland, Me.

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ORIGINAL COMMUNICATIONS.

TEETH OF RABBITS.

BY FRANK ABBOTT, M.D., NEW YORK, N. Y.

(Read before the American Dental Association, August 3, 1887.)

BELIEVING, as I do, that there is often beneficial interest in variety, even in study, I have thought it advisable to vary the papers in my report of the Section on Microscopy and Histology this year by giving a short dissertation upon comparative anatomy of the teeth, choosing the Rodentia as a class and the rabbit as a type of purely vegetable-eating animals for my subject.

The two lower incisors of the rabbit are chisel-shaped formations growing from the lower jaw-bone, and held in position by means of an intervening layer of fibrous connective-tissue, as described by Owen, only the anterior or convex surface is provided with a thin layer of enamel, whereas the posterior or concave aspect is lacking this tissue. Hilgendorff states (*Berlin Akad. d. Wiss. Monatsbericht*, 1865) that the incisors of hares differ from those of all other rodents, in having enamel all around them, although very thin at the back. This thin layer is present, but it does not present the features of enamel, but rather a tissue kindred to cement,—devoid of cement corpuscles, however. Tomes says ("Dental Anatomy," 1882, page 366) that "a thin external coat of cement is found upon the back of the tooth, but is not continued far over the face of the enamel." If he had left out the word "far," I would have had no good grounds for disputing his statement. As it is, I will admit only that a thin coat of cement is present on that portion of the incisors inclosed in the jaw-bone. There exists, however, a coat of bone-tissue over the enamel of the posterior surface of the fifth or last molar of a two-months'-old animal. Owen states that "there is not only cementum present, but it covers the enamel." He says ("Odontography," page 399): "The teeth thence projecting consist of a body of compact dentine, sometimes with a few short medullary canals con-



tinued into it from the persistent pulp-cavity, with a plate of enamel laid upon its anterior surface, and a general investment of cement, which is very thin upon the enamel, but less thin in some rodents upon the posterior and lateral parts of the incisors." As before stated, I have been unable to discover the slightest indication of the

FIG. 1.

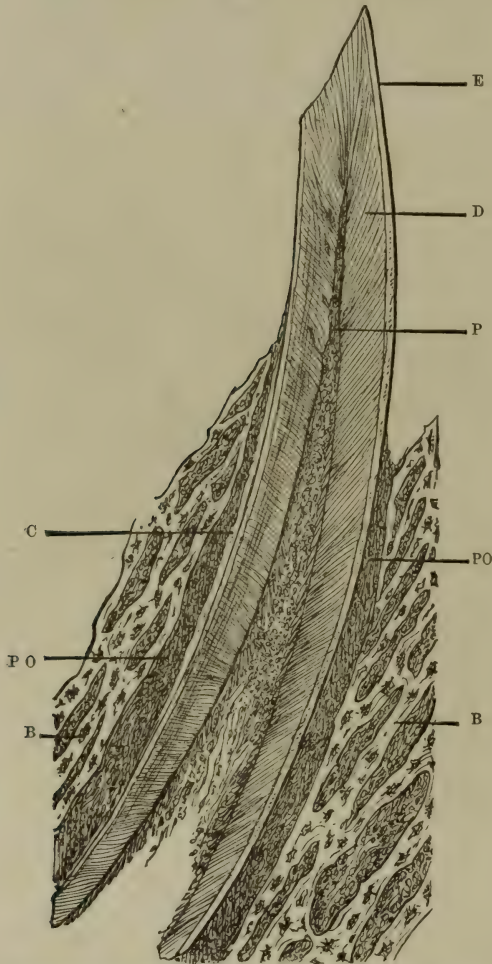


FIG. 1.—Lower incisor of a Rabbit two months old; *vertical section*. E, enamel; D, dentine; P, pulp; C, thin layer of a tissue kindred to cementum; PO, periodontium; B, bone.  $\times 20$ .

presence of cement covering or partially covering the enamel of incisors. The enamel slightly protrudes at the cutting-edge of the incisors, as stated by Owen, and the dentine produces a sloping surface downward and backward, always making a complete investment around the pulp-tissue. (See Fig. 1.)

With low powers of the microscope we observe a striking difference in the structure of the dentine between the anterior and posterior portions. In that portion anterior to the pulp-canal the canaliculi are arranged with great regularity, running an oblique course either upward or downward and outward, and becoming nearly horizontal at the border of the dentine. The latter feature is especially marked in the upper portion, or toward the cutting-edge of the

FIG. 2.

En

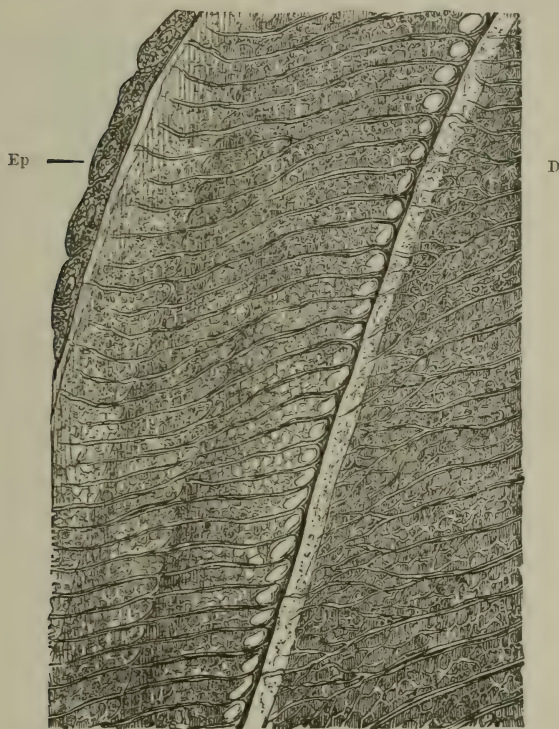


FIG. 2.—Anterior portion of an incisor of a full-grown Rabbit; vertical section, obtained by grinding. D, dentine; En, enamel; Ep, flat epithelium covering the anterior surface of the enamel.  $\times 800$ .

tooth, while that portion posterior to the pulp-canal shows the canaliculi arranged at less acute angles, and much less regular.

The pulp-canal is a cone-shaped cavity occupying the center of the dentine in a rabbit two months old, whereas in a full-grown animal the pulp-canal is much narrower and runs eccentrically, with a coating of dentine thicker anteriorly than posteriorly to it. In the young animal the dentine shows very few and narrow medullary canals near the border of the pulp-canal, while in the full-grown

such canals are very numerous, especially in the lower or root portion of the tooth. Again, such canals are less numerous in the anterior mass of dentine than in the posterior. Only near the root-end of the tooth do we find such canals nearly evenly distributed in both portions. The general direction of the canals corresponds with the direction of the canaliculi, this being slightly upward in the young and growing animal, and slightly downward in the old or full-grown. From these facts it follows, as stated by Owen and Tomes, that the anterior portion of the dentine is more thoroughly calcified than the posterior.

With higher powers of the microscope the structure of the enamel, which covers the anterior or convex surface of the dentine in an almost uniform thickness throughout its entire length, becomes plainly visible. It is composed of rods taking a slightly sigmoid course upward in the young and downward in the old animal. (See Fig. 2.)

The bases of the rods are very marked, almost rosary-like, in the grown animal, caused probably by the slightly oblique cutting of the section. The interstices between the prisms are narrow, and in many places show the extremely delicate fibers. The interstices reach the outer periphery of the enamel occasionally only; whereas the majority of them stop short of the periphery. The reticulum is conspicuous all throughout the prisms,—more so in the neighborhood of the dentine than at the convex surface of the enamel, where the minute structure, visible without the aid of any reagent, gradually fades away, until the outermost rim appears hyaline or structureless. This fact again coincides with the statement of Owen and Tomes, that the outer portion is more thoroughly calcified than the inner. Owen's assertion, however, that there is a marked difference in the structure of the two portions, I am unable to corroborate, as far as the incisors are concerned, though faint traces of a stratification of the enamel are to be seen. The outer periphery is covered with a single layer of flat nucleated epithelia, visible only upon that portion of the tooth protruding from the gum. The dentine with high powers of the microscope shows in its basis-substance a delicate reticular structure, more conspicuous even than in the provisional teeth of man. The canaliculi, containing delicate fibers, bifurcate freely upon approaching the periphery near the enamel. Here a zone exists characterized by a lack of distinct structure, and most of the canaliculi stop short of this hyaline layer, only a few traversing it and reaching the interstices between the enamel-rods. The dentine back of the pulp-canal shows great irregularity in the course of its canaliculi, which become considerably widened as they approach the concave surface. The general direction of the canaliculi is radiating, but numerous bundles run parallel with the surface, in an



almost rectangular direction to the radiating ones. Near the posterior periphery the canaliculi of both directions unite in loops, and by their inosculation through an intervening reticulum a beautiful picture is presented. (See Fig. 3.)

The reticular structure becomes little marked in a layer near the concavity, and is lost sight of altogether directly on the periphery. Here, the same as on the convex surface of the enamel, a single layer of flat epethelia is seen covering the free portion of the incisor.

FIG. 3.

D



FIG. 3.—Posterior portion of an incisor of a full-grown Rabbit; *vertical section*. D, dentine; R, hyaline layer; Ep, epithelium.  $\times 800$ .

The pulp-tissue is medullary in the young and fibrous in the grown animal. In the immediate vicinity of the dentine odontoblasts or medullary corpuscles in a chain-like arrangement are seen in the young animal. The medullary tissue is traversed by a larger number of bundles of medullated nerve-fibers and capillary blood-vessels. Here and there globules of high refraction and without apparent structure are met with, which I conclude are depositions of calcareous matter. In the full-grown animal, where the pulp-canal

is considerably narrowed, the delicate fibrous connective-tissue still holds a large number of capillary blood-vessels, which extend into the lateral offshoots of the pulp-canal, previously alluded to as medullary canals. Dentine traversed by such canals is known as vascular dentine, or vaso-dentine; but, as in the vicinity of the medullary canals, bone-corpuscles are often met with, the term osteo-dentine becomes quite applicable to the tissue, coinciding with the nomenclature of Tomes. In some places this vaso-dentine is bordered

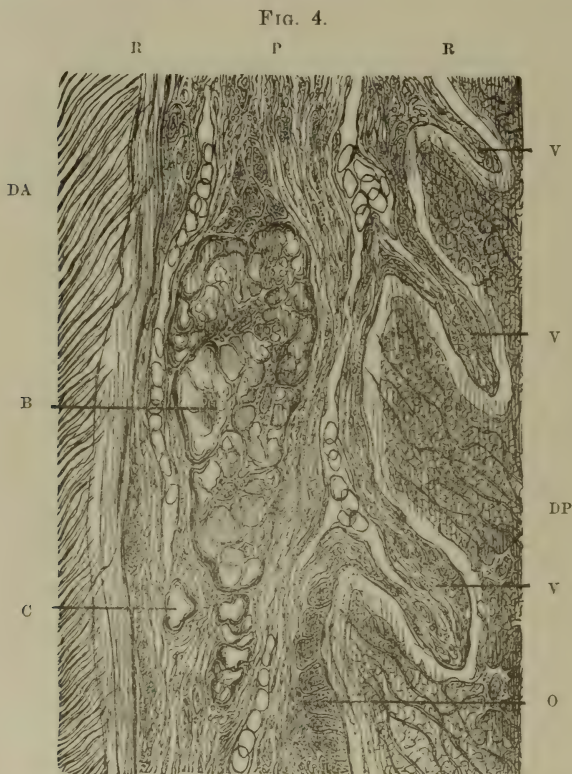


FIG. 4.—Pulp-canal of a lower incisor of a grown Rabbit; vertical section. DA, dentine anterior, and DP, dentine posterior, to the pulp-canal; R, R, structureless layer of the dentine bordering the pulp-canal; P, pulp-tissue with capillary blood-vessels, mostly filled with red-blood corpuscles; V, V, V, vascularized offshoots of the pulp; O, osteoblasts along the dentine; C, calcareous concretions; B, calcareous concretions with a number of bone-corpuscles; bone-corpuscles are scattered along the borders of the vascular canals.  $\times 150$ .

by formations kindred to odontoblasts, but, being shorter, rather resemble osteoblasts.

The pulp-tissue of the grown rabbit contains numerous calcareous concretions, greatly varying in size. In one of my specimens I have met with a formation closely resembling bone, supplied with a num-

ber of bone-corpuscles, whose territories are plainly marked. Obviously this mass deserves the name of "pulp-stone," and is of interest from a histogenetic point of view, since it demonstrates the close relationship existing between dentine and bone-tissue.

The borders of the dentine toward the pulp-tissue and the medullary canals are conspicuous by a lack of structure similar to the border on the outer periphery of the dentine. (See Fig. 4.)

The upper incisors, two in number, are markedly diverging in their root portions. Close behind them are two rudimentary incisors, known and described by previous observers. As to the deciduous teeth of rabbits which are spoken of by others, I can say nothing, since I have not examined these animals so early in life,—eighteen days after birth.

Rabbits have six molars in the upper and five in the lower jaw. Although separate teeth, they are cemented together into an almost continuous mass by intervening bone-tissue. I do not consider this substance as entitled to the name of cementum. As it appears in the study of molars of full-grown animals, it is ordinary bone-tissue wedged in between the single molars, while in the young animal there is an intervening layer of fibrous periosteum, or periodontium, between the teeth their entire length. In order to give a clear understanding of the arrangement of the molars, I will state that each tooth is constructed in materially the same manner as the incisors,—viz., they are coated with enamel only upon their anterior surfaces. This coat becomes gradually thinner on the buccal and lingual surfaces, and is lacking altogether on the posterior surface. The structure of the enamel differs from that of the incisors, inasmuch as it is composed of two layers,—a fact to which John Tomes (*Philo. Trans.*, 1850) first called attention as being present in the teeth of Rodentia, adding at the same time that two layers are missing only in hares and rabbits. (See Fig. 5.)

The first molar is the shortest and the fifth the broadest in the series. As the section from which the drawing was taken was cut nearly through the center of the teeth, we obtain a correct idea regarding the arrangement of enamel, which is seen on one side of the teeth only. It will be observed that the grinding surfaces are irregular, the highest point of each corresponding to about the junction of the enamel with the dentine. In a set of molars obtained by grinding, from a grown rabbit, the highest point corresponds about to the middle of the dentine; from which fact we may conclude that there is no general rule as to the configuration of the grinding surfaces of the molars, it depending upon the bearings of the upper teeth.

The teeth are separated from one another by an intervening layer



of periosteum, which extends upward to the level of the grinding surfaces, and contains in its middle portion trabeculæ of bone-tissue. To call this cementum seems to be entirely arbitrary, since it does not reach the lateral surfaces of the teeth; again, it develops in the middle of periosteum in exactly the same manner in which the jaw-bone is formed,—*i. e.*, first in the shape of cancellous bone, freely supplied with vascularized medullary spaces. In the full-grown animal there is no intervening layer of periosteum between the teeth, but the bone, likewise supplied with scanty and narrow medullary canals, is in direct contact with the lateral surfaces of the

FIG. 5.

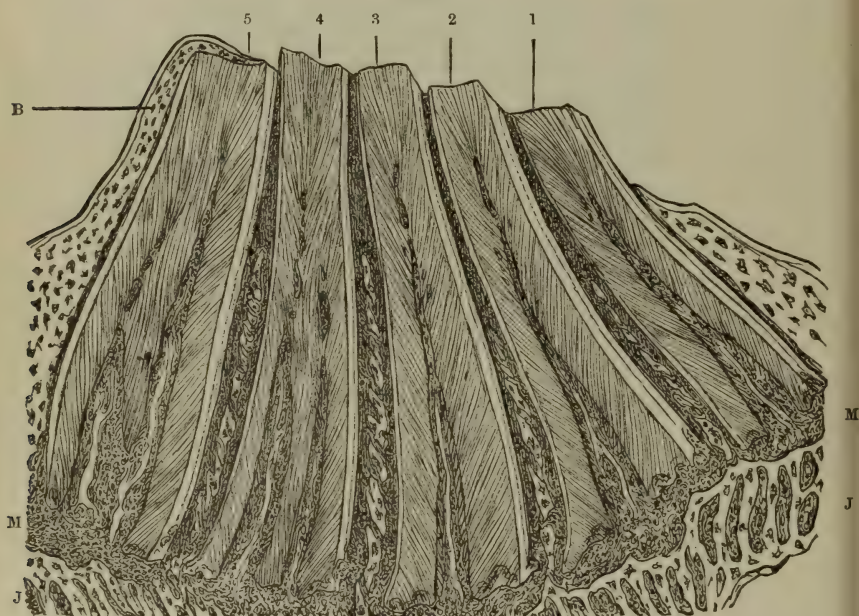


FIG. 5.—Lower molars of a Rabbit two months old; vertical section. 1, 2, 3, 4, 5, successive molars—1, the anterior, and 5, the posterior; M, M, medullary tissue continuous with pulp-tissue and the periosteum; J, J, jaw-bone of spongy structure; B, bone overlapping the posterior and grinding surfaces of the last molar.  $\times 10$ .

teeth; it also extends upward to the level of the grinding surfaces.

The dentine of the molars is constructed similarly to that of the incisors. The difference between the two portions, anterior and posterior to the pulp-canal, is most plainly marked in the lower or root portions, where the coarse reticulum produced by the anastomosis of the dentinal canaliculi is very marked on the posterior periphery of the teeth, where it is bordered, not by enamel, but by a dense, thin layer of an apparently structureless dentine. The fourth and fifth molars have two pulp-canals each, both in the young and the

grown animal. In the former the canals are very wide; in the latter they are reduced to a comparatively narrow slit, holding a central capillary loop, and being supplied at its borders with a varying number of vascular canals. The pulp-canals reach different heights in different molars, sometimes approaching, nay reaching, the grinding surface. C. S. Tomes, in speaking of the behavior of the dentinal canaliculi at the grinding surface, says that "here the canaliculi are very much narrowed." I can corroborate this statement, and can say further, that in many places they are not only narrowed near the grinding surface, but their calibers are completely lost, the same as the caliber of the pulp-chamber. In other places, however, the dentinal canaliculi are apparently unchanged at the grinding surface, and look as if transversely cut through. No marked changes in the bone-tissue at the point where it reaches the grinding surface seem to have taken place either. Only the layer of bone overlapping the grinding surface of the fifth molar shows a dense, apparently structurless, terminal layer along its whole extent. (See Fig. 5.)

The enamel of molars of rabbits is of considerable interest, since it is composed of two distinct layers,—the inner one being the enamel proper; the outer being in contact with periosteum or bone, and composed of interlacing and decussating fibers. It will be remembered that John Tomes makes the statement of Rodentia in general, that the enamel is composed of two layers, the inner being the decussating and the outer the plain enamel. In the hare and rabbit he did not discover the decussating, but the plain enamel layer only. I have not only found the two layers in the enamel of the rabbit, but have found the relations of the two the reverse of the statement of Tomes. High powers of the microscope plainly demonstrate the presence of the two layers; the inner, nearest the dentine, is composed of parallel rods, slightly narrower than those of the enamel of incisors, and traversed at right angles by cross-bars. The outer layer, nearest the bone-tissue (eventually the periosteum), is composed of delicate, wavy, calcified fibers, decussating mainly at right angles and traversed by interlacing bundles of such fibers, which latter, in a longitudinal section of the tooth, will appear cut transversely. In the latter group not infrequently small protoplasmic bodies are discernible, the presence of which is not so marked in the longitudinal section of the bundles. Although I am disposed to term this latter layer the "cross-layer of enamel," in accordance with the nomenclature of Tomes, I wish at the same time to express my doubts as to the real enamel nature of this layer, basing my doubts upon the study of the history of development of the enamel in pig-embryos, where a similar layer is found outside of the enamel proper. (See Fig. 6.)



Between the plain and cross-layers of the enamel there is no intervening zone, though the minute structure is strikingly different. At the border of the cross-layer toward the periosteum or bone, however, there is a thin, almost structureless, zone visible.

The relations of the four tissues entering into the construction of the molars is beautifully seen in transverse sections, in which the enamel, composed of two layers, is seen running along one side of the

FIG. 6.

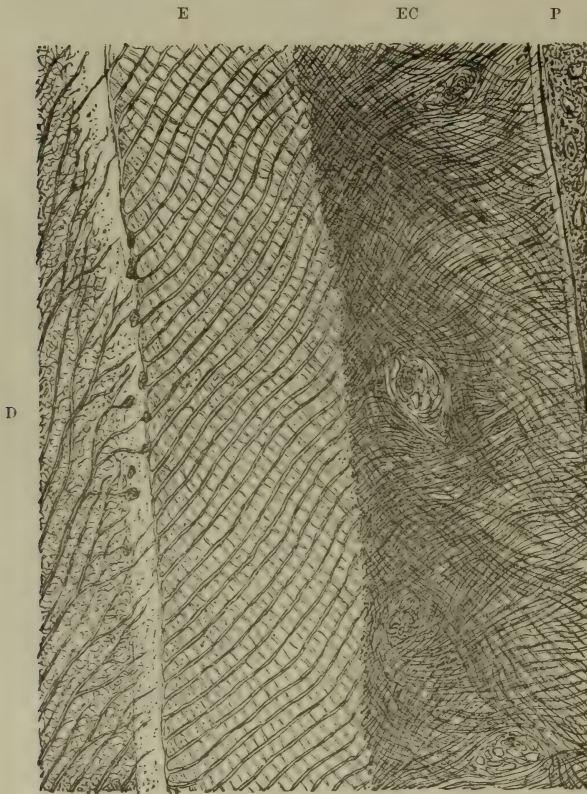


FIG. 6.—Root portion of a lower molar of a grown Rabbit; *vertical section*. D, dentine with small globular spaces at the border of the enamel; E, enamel composed of parallel rods; EC, cross-layer of enamel composed of bundles of decussating fibers; P, periosteum.  $\times 600$ .

tooth only. This enamel tapers upon approaching the surface, made up of structureless dentine, and terminates toward the latter in an oblique line, not very distinctly marked. On such sections we see that the surfaces of the teeth are not even, but provided with furrows, which gives the transverse section of the tooth a lobulated appearance. The interstices between the teeth, including the furrows, are filled with bone-tissue.



The root-ends of the molars give an opportunity for the study of the manner in which dentine and the two layers of the enamel are developed, not only in the young but in the grown animal, since the teeth of rabbits grow continually throughout their existence. (See Fig. 7.)

The dentine at its base is supplied with bay-like excavations, filled with medullary tissue. Such excavations exist also at the

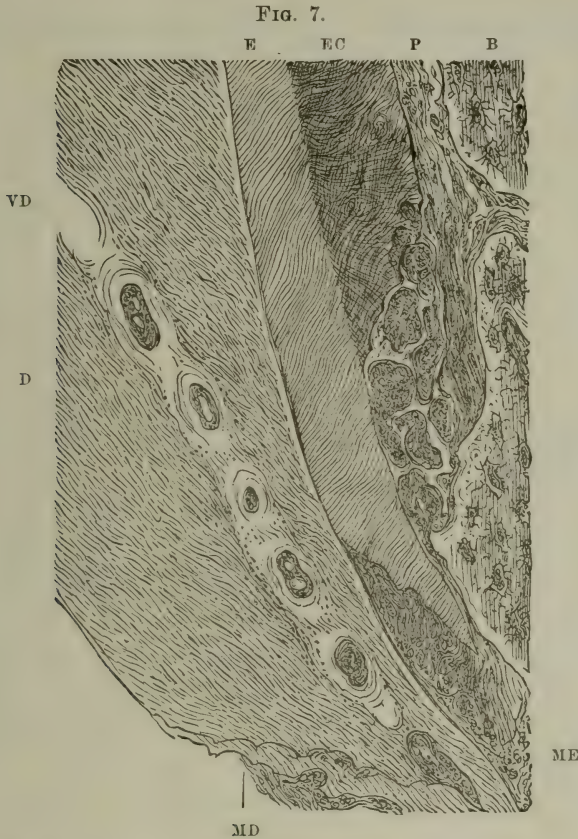


FIG. 7.—Root-end of a molar of a Rabbit two months old; *slightly oblique section*. D, dentine with obliquely-cut canaliculi; VD, vaso-dentine; E, enamel, composed of parallel rods; EC, cross-layer of enamel; P, periosteum; B, bone; MD, medullary tissue from which dentine develops; ME, medullary tissue, the germ of enamel.  $\times 100$ .

lower end of the plain enamel, though only slightly marked. The tissue close beneath this layer of the enamel shows a rod-like arrangement of the medullary corpuscles. Evidently both these tissues develop in rabbits in the same manner as in man. The cross-layer of the enamel shows at its bottom marked bay-like excavations filled with medullary tissue, in which there appear trabeculae of a

calcified basis-substance previous to the appearance of the calcified fibers.

In conclusion, I wish to acknowledge my indebtedness to Dr. C. F. W. Bodecker for a number of sections of the teeth of rabbits two months old, and to Dr. C. Heitzmann for the preparation of these beautiful illustrations and for other assistance rendered in the production of this paper.

## DENTAL EDUCATION, LITERATURE, AND NOMENCLATURE.

BY LOUIS OTTOFY, D.D.S., CHICAGO, ILL.

(Report of Section II, by the Secretary of the Section, before the American Dental Association, August 2, 1887.)

SECTION II, Dental Education, Literature, and Nomenclature, begs leave to submit the following as its annual report:

The possibility of the postponement of this year's session, as well as the uncertainties surrounding the probable time and place of holding this meeting of the association, have made it impossible to secure any aid from members of the Section. Hence this paper and two short papers are the result of its labors.

### PART I.—DENTAL EDUCATION.

While nothing of special importance affecting dental education in the United States has transpired during the past year, there seems to be a concerted general movement and desire to elevate the art and science of dentistry by means of education, and to raise it from the creditable position which it has acquired during the last decade to a still more exalted plane. Thus the many occurrences tending to bring about this result are of sufficient consequence to be noted in this report.

The number of schools devoted to the special education of dentists has increased from twenty-four to twenty-eight during the past year. These schools are located in fifteen States and the District of Columbia in the following order:

California . . . . .	1	Michigan . . . . .	1
Georgia . . . . .	1	Minnesota . . . . .	2
Illinois . . . . .	3	Missouri . . . . .	3
Indiana . . . . .	1	New York . . . . .	1
Iowa . . . . .	1	Ohio . . . . .	1
Kentucky . . . . .	1	Pennsylvania . . . . .	3
Maryland . . . . .	2	Tennessee . . . . .	3
Massachusetts . . . . .	2	District of Columbia . . . . .	2

Of these, one is devoted exclusively to the education of the colored race, some admit both races and sexes, while others are confined entirely to white males. From twenty-five of these schools there have been graduated since the last meeting of this association 597 students.

From one school no report has been received, and two of the twenty-eight colleges have not yet held commencements.

To the resolution adopted by the National Association of Dental Examiners, and which reads as follows :

*Resolved*, That this association instruct its members after June, 1885, to recognize as reputable no dental college which does not require as a requisite for graduation attendance upon two full regular courses of lectures and clinical practical instructions, which courses shall be of not less than five months' duration, and shall be held in separate years, with practical instructions between the courses, and that does not require preliminary examination of applicants before matriculating them,

at present twenty-five colleges do conform, the Dental Department of Howard University having recently declared its intention to be governed by it; two colleges—namely, the Dental Department, National University, and the Dental Department, University of Tennessee—do not conform; and one school recently organized in Missouri has not yet issued its announcement. It will thus be seen that there are but two schools in this country which will graduate students who have attended less than two full courses of lectures.

Pursuant to the following resolution, referred to this Section by this association at the last annual meeting :

*Resolved*, That this association would recommend to the various dental colleges of the country that the interests of higher education demand that the college course of instruction be uniformly extended to nine months in each year,

the secretary of the Section has sent copies of the resolution to all the deans of the various dental colleges of the country, and presents as a result of such inquiry the following :

From five schools no reply has been received, and from twenty-three replies the following extracts will illustrate how the subject was received :

One says :

"For the present, at least, this college could not think of entertaining for a moment such a proposition; it would be impossible to do so, and this matter should more properly come up before the college association."

Others say :

"This college has already extended its course to nine months, and to three years, and will continue to hold that position."

"The course of practical instruction in this college occupies twelve months in each year. The regular course of lectures, fifteen each week, is five months in length. A spring course of two months, ten lectures each week, follows. The subject of increasing the regular course considerably is under consideration now by our faculty. It will be done soon, I think."



"The winter session of this college is five months, though we have lectures and clinics nine and one-half months in the year, which about one-half of the class attend. The time is not far off when we shall adopt a nine-months' session."

"As to your proposition, it is new to us. I will, however, submit it to the faculty at its next meeting."

"As far as I am able to judge, the heads of this college regard favorably an increase of the present term of seven months; but I feel equally certain that the faculty is not favorable to a nine-months' term; certainly not for this latitude, where we run into violent heat. Eight months might be a satisfactory compromise."

"This dental college organized thirteen years ago with a six-months' course, and for the last three years has had a full nine-months' course each year. I am gratified to say that this is more satisfactory to all concerned than the shorter term. The American Dental Association did well to give utterance to this resolution, and if need be it should be reiterated each year."

"Our school gave the last term, preliminary course, one month; regular session, five months; spring course, two months; the last confined almost entirely to the practical. We will not adopt the nine-months' term, I think, but shall shape our teaching for the best interests of the students as we see it."

"Our present arrangement is for six months, but you may rest assured that this school will endeavor to appear in the 'rank and file' of the very highest order of dental education. I am heartily in favor of the nine months."

"We have had a nine-months' term since 1875. No winter, summer, and fall sessions, but a continuous lecture and clinic session beginning the last week in September and continuing till the last Wednesday in June, with two short vacations of about nine days each at Christmas and Fast week."

"Our college already requires one month longer course than most of the dental colleges of the United States, and I do not think we are in favor of making the session longer than it is at present. I confess that nine months is none too long, and I am selfish in not being in favor of the movement; but we are giving our time, and have been since the college was organized, without pecuniary reward, or hope of any. The drain upon our time is considerable, and I for one certainly will not consent to increase that time three more months during the year."

"At the last meeting of our faculty the matter was considered and talked over for some time. We are all decidedly in favor of it. So also is the board of regents of this university. The only difficulty in the way here is finances. The present appropriations are

not sufficient to cover the expenses of the change. However, as the executive committee of the board was in session to-day, I went before them with your letter. They made this statement officially: 'We are in full sympathy with the change, and if the funds were adequate would urge its adoption by the board; but as the appropriations at present will not cover the extra expense, we can only say that in our plans of action for increased appropriations this will be a factor, and a strong effort to secure it for the purpose will be made.' "

"In our announcement for 1883 we gave notice that our session of 1884 would be of nine months. Each session since that time has been of that length. I think our college was the second in the United States to adopt a nine-months' term, and we are well pleased with the result."

"The full course of this college is made up of fall, winter, and spring terms, nine months in all."

"The board and faculty are opposed to terms of nine months, for the reason that it affords no time for repairs and keeping up the properties of an institution, and that the faculty of this college labor hard and faithfully during five months of each year for the benefit of students, and they should be permitted to rest from such labors and devote some time to business and recreation. The proposition for nine months certainly did not come from a laborious faculty. Therefore, this college favors three terms of five months each, as affording a better system of rests for students, whom nine months of strain would probably injure physically, mentally, and financially. Very few young men have the cash to remain at college over five or six months at a time."

"This college in a course of six months embraces a greater number of lectures than is delivered in those schools which have increased their terms to nine months. When we add to this the spring course of three months, and still further add the summer instruction, we exhibit a more lengthy course than in many nine-months' schools. Our college is not likely to change its course of instruction soon, nor will we lengthen it. We now have didactic lectures nine months, six of which are obligatory, and instruction is given to students during the entire year. I would suggest to you that you procure the lecture schedules of all the dental colleges, and satisfy yourself as to how many lectures are given in each. There is more moonshine about this nine-months business than anything else. Its principal value is in the extending of time for the practical work."

"Our academic year consists of nine months."

"We are not likely to adopt the nine-months' term."

"This college has adopted the nine-months' term (by resolution

passed by the board of directors in January last). I can officially certify to our hearty indorsement of the resolution in question."

"Cannot upon so short notice consult faculty. Think may safely say they would not favor a nine-months' session. It is very probable we now give quite as much instruction in the 'fundamental branches of medicine,' and theory and practice of dentistry, as certain dental departments who have longer sessions."

"On account of the financial condition of our students, it will be quite difficult if not impossible to extend the length of our session to nine months. We think it will be better to require three sessions of five months each than two of nine months."

"This college will favor the resolution, and will with the other reputable colleges do all it can to extend the term to the length of time recommended in the resolution."

"I can state that this dental department gives twelve months in each year as a college course of instruction. Our collegiate year is divided into two sessions of five and seven months, the second beginning as soon as the commencement exercises are over.

"Our school has not taken action as yet on the recommendation of the American Dental Association. We will be governed in a manner by the medical department, as we are only a part of the college."

Before referring to the status of dental education in the United States, the consideration of the status of dentistry in foreign lands may be interesting.

In Great Britain the degree has a national character, and while the error permitting promiscuous registration at the time of the enactment of the law has been injurious to the profession, at a time when the registers are clear of the names of men of questioned professional standing or ability the condition may be more wholesome than in the United States. Mr. Morton Smale, dean of the Dental Hospital of London, fitly says in connection with this subject:

Speaking of those who are ashamed of their vocation, because there are black sheep on the register, he very truly remarks that "they might with equal justice be ashamed of their humanity because there are members of it who habitually disgrace it; the best of mankind, however, 'walk not on the other side,' but endeavor by good example and providing education to raise the renegades to a higher standard of morality and self-respect." Of the preliminary examinations, he strongly recommends the matriculation of the University of London, as being the most all-around in its subjects, and the portal through which the student may pass into almost any department of medicine, science, or art, should he so wish, at any future time. The regulation now in force at the Royal College of Sur-



geons of England, requiring an apprenticeship, he hopes will never be rescinded, for it is impossible for a thorough practical experience in dental mechanics to be gained at a dental hospital. He then passes on to the question of the desirability of taking the M.R.C.S. and L.R.C.P. in addition to the dental diploma, giving many apt examples of the value derived therefrom, and shows how this can easily be done by the moderately hard-working student.

Perhaps the example of the German Government is the most favorable one to imitate. In that country dental education has been under the control and direction of the general government since 1852, as much as the United States army and navy are under the control of the United States Government, and therefore all of the legal dental colleges are the departments of thoroughly equipped universities controlled by the government, and supplied with corps of teachers whose talent and education are above reproach. Dental departments are established in many of the universities, and the curriculum comprises all branches of dentistry.

In Austro-Hungary dentistry has not hitherto presented a very favorable aspect. "The opportunities for perfecting one's self in dentistry in Hungary are very meagre indeed. They have been so for fourteen years, although, perhaps, not to a greater extent. Before that time dentistry was taught by an 'extraordinary teacher,' with whom occasionally some private tutor divided that honor. But even then the subjects embraced in the course were not divided between the two, but both were teaching the same subject under the term of 'general dentistry.' The special dental examination was optional, and only such obtained the diploma conferred who chose so to do; the possession of the document was virtually without an object, either as a certificate of legality or qualification; as the former was already conferred by the 'surgical' examination, and by the latter the fact of qualification was not established by reason of the excessively lenient examination to which the candidate so readily submitted.

"At present, however, the passing of a dental examination, which is still more lenient than formerly, is not legally prescribed.

"Virtually, then, it may be said that the entire teaching of dentistry for the whole of Hungary is being conducted by one person, and he a private tutor of the University of Budapest, who is thronged by the thirsty aspirants for knowledge, as nowhere else in the entire domain of Hungary can they listen to the teachings of dentistry.

"According to the conditions just described, it is absolutely necessary for anyone wishing to perfect himself in dental science to visit foreign countries,—to go at least to Berlin, but advantageously even farther; or to become apprenticed for several years to some first-

class private practitioner, which in this (that) country is done with difficulty and accessible to but few. In other countries the establishment of dental colleges has been found essential. The need for them exists in Hungary as well, and the demand ought to be supplied, but by thorough and well-equipped schools, so that those who desire to perfect themselves may do so at home. Whether the plans now under advisement by the minister of education, when carried into execution, will fully meet these wants remains to be seen.”\*

In France restrictions governing the practice of dentistry and the qualification of practitioners have but recently been enacted. G. C. Daboll, M.D.S., of Paris, France, writes (*Dental Review*, Vol I, No. 1, pp. 42, 43) of the condition of dentistry in that country as follows:

“There exist to-day two schools in Paris devoted to the interests of the dental profession. In both of these schools the student can get instruction in every department of our science. It would be too much to claim now that practically he would gain as much as in one of our best American institutions, for these schools are young, and the demand of the French people does not call for as high a standard of practical education. In certain branches no schools in the world give greater facilities than these for the attainment of the best education the student could desire. In anatomy, physiology, pathology, therapeutics, chemistry, materia medica, surgery, etc., the student has every advantage. In prosthetic dentistry the French dentists are skillful to the point of giving the highest finish to their work; but in this department, as in operations on the natural teeth, the demand has not stimulated them to overcome the difficulties of adaptation; consequently one sees many defects in artificial dentures.

“In operative dentistry, from a scientific point of view, the French are in their infancy. In an old civilization like this it is a slow process to change the established order of things, and especially where it must be for a long period a pecuniary loss to the profession. There are many men in the dental profession in France capable of doing excellent work, but the impossibility of attending to from twenty to forty patients daily is an effectual bar to the exercise of one’s best gifts.

“The ‘fee system’ of charges for professional services is undoubtedly the reason why dentistry in this country has not, in the years past, attained higher excellence. The operator who receives no greater fee for an operation requiring an hour for its performance

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\* Joseph Iszlai, M.D., Budapest, Hungary, in *Dental Review*, Vol. I, No. 2, pp. 98, 103.

in one way, which can be completed in fifteen minutes if done in another way,—especially when he has fifteen patients awaiting his services in the reception-room,—is not likely to give the patient in hand the benefit of the longer time and greater excellence; and he is not to be held responsible entirely for this. The patient, in the majority of cases, asks no more, expects no more,—in point of fact, decidedly objects to more.

“This condition of things can only be revolutionized by education,—first of the dentist, second of the people; and the first step was taken in 1880, when the Dental School and Hospital of Paris was founded by public subscription and a subvention from the city of Paris. The course requires three years, upon the completion of which the graduate receives the diploma of the dental school (*diplome de l'École Dentaire de Paris—D.E.D.P.*).

“Dr. M. M. Levett, an American dentist, occupies the chair of operative dentistry. It must take years, as a matter of course, before the effect of this school will reach the people; but it is sure to come.”

In Switzerland there is a dental school at Geneva, and for admission to practice special course examinations prevail.

“Hitherto the method in vogue of admitting dentists to practice in Switzerland has been very incomplete and unsatisfactory, each canton having its own standard of admission and examination, which in some of them is very inferior and entirely unsatisfactory. Steps have been taken to secure the passage, in the *Bundesrath*, of an act to regulate the practice of dentistry, by requiring uniform compliance throughout the republic.” \*

“In Sweden the first step in the direction of procuring better facilities for the education of dentists was taken in 1878. The requirement of passing a preliminary examination was made obligatory upon those who commenced the study of dentistry. Thus, Sweden is one of the few countries where the standard of requirement is high; nevertheless, since the necessity of a preliminary examination, the number of students has steadily increased. As there are in Sweden no schools or dental departments where an entire education may be completed, students receive education in the mechanical branches from private tutors and in private offices. After having completed two years of study in this manner, the candidate is subjected to an oral examination in chemistry, physics, metallurgy, etc., and to a practical examination comprising the manipulation of the metals and plastics in prosthetic dentistry.

“Having successfully passed such an examination, the candidate receives employment as an assistant in the office of his preceptor,

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\* *Dental Review*, Vol. I, No. 5, p. 272.



whenever such a course is possible, and during this period his theoretical studies continue, comprising the dissection of the head and neck, lectures by private tutors on physiology, pathology, surgery, materia medica, etc., and attendance on clinics at the polyclinic of oral and dental surgery, erected and maintained for this purpose by the Swedish state authorities. This course comprises two years, and includes, in addition to the practical instruction, demonstrations, lectures on operative dentistry, the making of obturators and other appliances. Upon completing this course the candidate is subjected to a final examination before a board of examiners, consisting of a professor of surgery, a professor of anatomy, and a dental practitioner. The latter examines the candidate in all the practical branches of dentistry, which examination is made partly at his office and partly at the polyclinic, and comprises the making of one metal plate, one vegetable-base plate, one gold plate with clasps and suction-chamber; fillings of gold, amalgam, and other plastics; conservative treatment of the pulp, antiseptic treatment of decay, and the treatment of other diseases of the mouth. The examinations before the professors of anatomy and surgery are entirely oral. No diploma or title is granted to the successful candidate, as the holding of a philosophical or medical degree only is recognized."\*

"In Russia the qualifications necessary to entitle any person to establish himself in practice consist of, first, the possession of a certificate from a practicing dentist showing that the applicant has served two years as an apprentice; second, an examination in matters pertaining to dentistry; the standard, however, being a very low one, as the requirements hardly exceed the ability to extract teeth and answer to a few simple questions in anatomy. A dental school has recently been established in St. Petersburg, to prepare candidates for graduation, in which the principal branches—the practical ones—are but poorly organized, although the theoretical teaching is thorough."†

In Cuba the dental colleges and academies furnish poor and imperfect education. The institutions are turned into miserly establishments; conducted for pecuniary interest, and the fact that the dentists composing the board of examiners for the island are financially interested in the schools makes an unsatisfactory state of affairs.

"The Brazilian Empire at present has two medical faculties (*faculdades de medicina*), one of which is located at Rio de Janeiro, and the other at Bahia. The faculties are not private institutions, but are

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\* Rudolf Skogsborg, in *Dental Review*, Vol. I, No. 5, pp. 270, 271.

† W. Schibbye, in *Dental Review*, Vol. I, No. 3, p. 161.

under government patronage and surveillance. At both of these universities instruction in dentistry is given, which differs but little from the medical course. In these institutions, as well as in those of Germany, the chairs of professors are occupied by men who have studied in Europe, whose ambition, almost fulfilled, is to elevate the Brazilian universities to the same high standard which those in Europe enjoy.

"Students in dentistry are required to attend a three-years' course, in which the studies are divided as follows: First year, physics, chemistry, and general anatomy; second year, histology, physiology, pathology, and hygiene; third year, therapeutics, special surgery of the head, and dentistry in all its scientific and practical branches. After passing the examinations successfully the candidate receives the title of *cirurgião-dentista*, or surgeon-dentist, similar to the titles conferred in other countries except in the United States.

"As far as foreign dentists are concerned, it is exceedingly difficult for them to locate in Brazil unless they are familiar with the language of the country, as all must submit to an examination in that language. Those who possess foreign diplomas, whether they are Brazilian subjects or not, are obliged, first, to have them approved by the Brazilian consul or minister in the country in which they studied, and the various consuls of Brazil are instructed to approve none but the diplomas of recognized and reliable universities; second, the diploma must be approved by the local consul in Brazil, the minister plenipotentiary or chargé d'affaires, and finally by the minister of foreign affairs of the Brazilian Empire. After having thus been approved, the holder of the document is entitled to an examination without attending either of the Brazilian universities. This examination extends over a period of from three to four weeks, and comprises the subjects of anatomy, physiology, histology, physics, chemistry, hygiene, pathology, therapeutics, special surgery of the head, and dental science in its theoretical and practical phases, or in other words the same examination that is required of a three-years' course student in the universities of Brazil. Accordingly, Brazil in this respect is in the front ranks. The law against violators is administered with severity. The offender practicing without authority is fined for the first offense seventy-five dollars; for the second, two hundred dollars; and the third offense is punished by from three to six months' imprisonment." \*

From these reports of the condition of dentistry in foreign countries it may be safely asserted that the education of dentists is receiving more attention than in the past. This is also true in a more

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\* Translation in *Dental Review*, Vol. I, No. 2, pp. 106, 107, from *Corres. f. Zahn*.

marked degree of the profession in the United States. A healthy, progressive upward tendency prevails, and it will result in bringing the profession nearer to perfection. The colleges are more thoroughly equipped for the education of dentists than in the past. While many of the schools are independent of medical colleges or universities, and while in that position they succeed as well as those more favored by prominent connection, it may be safely asserted that the true and proper principle, the one insuring the diploma of a dental college the respect it should command at home as well as abroad, consists in union with well-organized and thoroughly equipped universities. But in the selection of such connection, State or national institutions should be the only ones considered. Sectarianism ought to be held aloof from the education of dentists; hence the union of dental colleges with sectarian institutions, with the object of securing the patronage and respect conferred by the name, are deleterious to dental education. Although many independent dental colleges, sustained by private enterprise, are doing their share toward the proper education of dentists, it is safe to assert that a school from whose interests the monetary question is entirely eliminated is in a better position to do the most good as an educator.

"The opening of a school devoted especially to the education of the colored race marks a new era in the progress of dentistry, in affording them an opportunity to educate themselves, untrammelled by questions of race or color, in a school of their own. It is to be hoped that the college may receive its full quota of students, and send forth an army of educated colored men, who will elevate and teach their fellows in regard to their dental organs. Hitherto there has been no good opportunity for the colored man of education, sense, or taste to procure proper service at the hands of the white dentist. Most of them do not wish to have colored patients enter their offices, and, if they condescend to do anything for them, it would be perhaps the extraction of a tooth in some dingy corner of the laboratory. The colored population of the United States in 1880 numbered something over six and a half millions. A large number of these people are well educated; many of them are well to do and respectable; they all unquestionably are in need of dental service, and they only lack the opportunity to better appreciate dentistry. Indeed, it is very questionable whether the prevalent idea of good teeth among colored people is well founded. Our own observations do not bear out that assertion. The colored dentist of the future, it is hoped, will soon prove beyond question that the teeth of his race are no exception to the common rule regarding their liability to caries." \*

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\* Louis Ottofy, in *Dental Review*, Vol. I, No. 1.



The traffic in dental degrees carried on a few years ago in the United States by unscrupulous speculators has at last been completely suppressed; not, however, before having exerted a baneful influence abroad, having lowered the dignity and worth of the degree and the profession of the United States, and having worked serious hardship to dentists in Germany—to dentists who are graduates of American dental colleges. While in Great Britain degrees granted by two American schools (Harvard University and Michigan University) are recognized, the German Government (though never recognizing the American title or degree) tolerated its use by those entitled to it; but by a recent enactment has forbidden the use of any title except that which would correspond to the term “mechanical dentist,” to any persons unless they pass the examination prescribed by German universities. The same base traffic would have resulted in serious injury to the cause of dental education and to the standing of dentists as professional men in the United States had it not been for the seasonable passage of laws regulating the practice of dentistry in nearly two-thirds of the States of the Union. As an additional safeguard and fortification against unscrupulous venders of dental degrees, and for the common welfare, the various State boards intrusted with the enforcement of the law, having organized a National Association of Dental Examiners, have secured a fair uniformity of requirements in most of the States, and by resolutions seriously affecting the standing of those schools whose educational systems were not up to the required standard, they have secured in those institutions marked improvement. They have thus not only secured a fair uniformity of requirements, but later, by the organization of a National Association of Dental Faculties, the curricula of the various dental colleges have been made more uniform.

The preliminary examinations required of those entering the dental college have also exerted a wholesome influence, by admitting to the ranks of the profession principally those who will not only become worthy members but public educators as well.

A uniformity as near as practicable of the fees charged students by the various dental colleges ought to be secured by the National Association of Dental Faculties, and all advertisements of colleges designed to secure patronage should be discouraged. The effect of advertising resorted to by dental colleges devoted to the education of students cannot be otherwise than demoralizing, especially when the advertisements are of such a nature as to be entirely discountenanced individually by the gentlemen occupying chairs in those schools.

Dental societies and clinics are important factors as educators, and

there is yet much to do in the various States in these fields. Illinois has followed the example of New York, and established four district societies, making with one already in existence five districts,—a northern, southern, eastern, western, and central. While in a body of this character clinics may not be absolutely necessary, they should not be neglected in State and other local societies.

The practice of educating dentists by pupilage under the care of preceptors should be discouraged, unless offices devoted especially to this purpose are established, and unless they are in charge of persons who are teachers as well as dentists. It has been observed by those in positions to know, that the student who devoted some time before entering college to an apprenticeship is not as well fitted to take up the study prescribed by the college curriculum as he who comes with a good preliminary education, but untrammelled by uncomprehended ideas and vague suppositions, instilled by the practitioner too busy to devote time to him, or who is entirely lacking in the ability to do so properly.

One of these shortcomings which may be noticed here, and which, we believe, is general in nearly all our schools, is "the lack of educating the dentist to the proper appreciation of prophylaxis. The student, as he now leaves the portals of the college, is too much the dentist, mechanic, and operator, and falls short in being the doctor and teacher. His time has been occupied with practical subjects; his energies have been bent in two directions, namely and substantially, to fill teeth and make dentures. He has learned how to treat and how to save diseased teeth, and partially and fully replace losses of structure, but he has not learned that the work of the majority of dentists of to-day fails because of the ignorance of the masses in general. Many dentists, in consequence of not having had the idea firmly impressed upon them that without the proper education of the people all labor is worthless, plod on for years, perhaps, without in a single instance standing before their patients as doctors—teachers. They have stood there perhaps faithfully as operators, as mechanics, and, perchance, even as scientific men; but, notwithstanding all, they have failed to make good their title as teachers. Hence, dentistry is not making as rapid progress in the direction of education and prevention as it should. Almost perfection is attained in methods of repairing destruction and replacing loss of dental tissues, but there is not yet the full appreciation and understanding of preventing the necessity of such repairing and replacing.

"An earnest, serious impression should be made upon the student, before he leaves the college halls, of the grave importance of these questions. He should understand that he fails to perform his

mission unless he proves himself an educator of the people, as well as a good, conscientious, honest operator."\*

Dentistry in its relation to the state may be properly considered at this point. An English writer says that "in England the education of the dentist is three-fifths medical and two-fifths special, this special education being equal to the remainder of the medical education. It is thus recognized as a learned profession by the state, and we should endeavor to perform our duty in the service of the state. If medical appointments are made by the state when required, dental appointments should also be made. If dental services are required and not furnished, the interests of the state must suffer. Surgeon-dentists have been appointed to the royalty and to high offices, but should be also extended to the departments, for the benefit of unfortunates, as in the India and other colonial medical departments, the post-office, prisons, police, and most assuredly to the army and navy. Indeed, as long ago as 1857 the army medical department recognized the shortcomings as regards dental science.

"The only thing done for the soldiers being the extraction of a tooth or the giving of a pill to allay pain, the surgeon usually leaves this ancient and limited treatment to the hospital sergeant, although where, when, or how this functionary acquires his skill must be left to the imagination, as no provision is made for it in his course of special instruction. Numbers of men are refused admittance into the army and navy of Great Britain on account of defective teeth. Dental surgery has no part in the special training at Netley required by the army medical department, nor is it included in the medical training of the candidate before entering the service. The army surgeon's education is not considered complete when he leaves Netley, but a special examination is imposed on him between his fifth and tenth year of service. To this examination could be added a clause requiring a knowledge of dental surgery, and attendance on lectures and clinics. Some surgeons have done this, indeed, and obtained the diploma from special schools, and these serve to indicate the feeling of the want of such knowledge. Perhaps purely dental appointments could be made, and each officer and soldier could be required to produce a certificate that his teeth and mouth were sound before going into active service in the field. The present surgeon-general of the United States army informed the writer that no general provisions have been made by the government for dentists for the troops. A regular dentist is on duty at West Point, and also at the Naval Academy at Annapolis, part of the time, and several accomplished dentists are in the corps of the hospital stew-

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\* Louis Ottofy, in *Dental Review*, Vol. I, No. 2.



ards, but these are exceptions. The medical department has tried to arouse interest among its members in the care of the teeth by furnishing instruments when needed.”\*

Relative to the present status of dentistry, a recent writer in one of our dental journals thus expressed himself: “The facts are about as follows: There are now three or four per cent. of the dentists of the entire world who have regular medical qualifications, and they are engaged in the practice of dentistry as specialists in medicine. About two per cent. are Ph.G.’s, B.S.’s, or F.C.S.’s, and they do not practice as specialists in medicine. As near as can be estimated twenty to twenty-two per cent. hold the degrees of L.D.S., D.D.S., M.D.S., D.M.D., D.E.D.P., or hold certificates from State boards of examiners, or licensing bodies in foreign countries who do not confer degrees. Just how many of these believe they are practicing as specialists in medicine it is difficult to estimate,—probably not more than one-fourth at the outside. From this estimate, based on the statistics of all countries, we are led to conclude that about seventy per cent. of the dentists of the entire world are without medical or dental qualifications attested by colleges or licensing bodies.”†

In the interests of better education, well knowing the baneful effects of ignorance and neglect, the Section would cordially approve the adoption of some means of educating children in the public schools throughout the land on subjects pertaining to dentistry. In a few remote and rare instances this has been done to a very limited extent. Just as the cause of temperance will grow, not by fanatical outbursts of ridicule or persuasion on the adult or matured mind, but by careful reasoning and scientifically teaching the young the effects of alcohol on the system,—the baneful effects of intemperance and alcoholism,—so would the work we so ardently endeavor to accomplish be much simplified, aided and abetted by the properly educated school children. Lectures by competent dentists should be delivered in the public schools throughout the land. In some of the schools, especially in larger cities, the subject of physiology has been introduced into the curriculum of even the grammar grades, and the popular method of teaching by the sense of the eye by illustration, as well as by other senses, has resulted in the execution of drawings representing various portions of the human body by boys and girls of less than fourteen years of age, which would do credit to a majority of adult persons. We have seen drawings of the bones of the face, including the maxillæ, which certainly approach perfection. Such practice must ultimately result in much benefit.

In France, perhaps, as much as in any country, more attention has

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\* George Cunningham, A.B., D.M.D., London, England.

† A. W. Harlan, editorial in *Dental Review*, April, 1887, page 341.

been paid to the education of school children and the preservation of their teeth. While taking pleasure in reporting a marked improvement in the education of the public in general, and while this wholesome condition is noticed, the dentist should not forget that there is much more for him to do; there are still multitudes on multitudes who need education from the dentist. The distribution of small pamphlets relating to the care of the mouth and the teeth has resulted in much benefit to the reading class.

Intimately kindred to the subject of dental education, and appropriately here considered, may be some of the recent discussions and developments relating to the standing of the dental profession among and as one of the learned professions. During the past year acrid controversies have been participated in by prominent members of the profession, occupying both sides of the question, and while numerous proofs are cited by dentists who are or are not members of the medical profession, important action has been taken by the representative body of medical men in this country in the following resolution adopted by the American Medical Association at its meeting held in June last:

*Resolved*, That the regular graduates of such dental and oral schools and colleges as require of their students a standard of preliminary or general education and a term of professional study equal to the best class of the medical colleges of this country, and embrace in their curriculum all the fundamental branches of medicine, differing chiefly by substituting practical and clinical instruction in dental and oral medicine and surgery in place of practical and clinical instruction in general medicine and surgery, be recognized as members of the regular profession of medicine, and eligible to membership in this association on the same conditions and subject to the same regulations as other members.

Whether we as dentists agree with the spirit of that resolution or not, no one will venture to gainsay that a recognition of that character is worthy and elevating. While as a profession embracing dentistry and composed of dentists we may be proud of the position occupied, we entertain the belief that dentistry with the most perfect system of education can never rise to the rank of a profound cardinal profession, unless it does so as a branch of or specialty in law, divinity, or medicine. Dentistry, limited and confined as it is to but a circumscribed portion of the human anatomy (an important portion, it is true), in importance will nevertheless be ranked so low in the scale that those giving their life and time to its work can never be classed among the great professions. The changes and alterations in our methods of practice, taking place simultaneously with the education of the dentist, will eventually so alter the principles and practice of dentistry that those now living who could then observe the change would readily admit that there are but three professions, and that dentistry is an important branch of one of them.

Dentistry has certainly received much consideration of late at the hands of assemblies and bodies of learned scientists and physicians. Sections have been set aside for the consideration of oral and dental surgery in many of them. This is true of one of the most highly honored of German national societies, as well as of the American Medical Association in our own country, and the International Medical Congress so soon to meet, and to whose success every lover of his profession should richly contribute.

## PART II.—DENTAL LITERATURE.

While possibly among dentists literary tastes do not prevail to as marked a degree as among members of other professions, the progress of literature during the past year has been as favorable as during former years. In a profession whose advancements and improvements are almost of daily occurrence, in order to secure the best results the most favorable means are promoted by the current and periodical literature of the profession, and in that field several important additions have been made during the past year.

To the four journals hitherto published in the French language, an addition has been made by the appearance of the *Revue et Archives Suisses d'Odontologie*, at Geneva, Switzerland; while the six German publications have been reinforced by the addition of one. In the United States during the past year the *Dental Review* and *Western Dental Journal* have made their appearance.

Relating to text-books, the following from the transactions of the last meeting of the National Association of Dental Faculties may be quoted:

"Text-books are needed on the following subjects: Oral surgery; dental pathology and therapeutics; operative dentistry and orthodontia; dental chemistry and metallurgy; dental prosthesis. Books on other subjects seem to be very well provided for at present. The report recommends that committees be appointed to solicit the writing of such books and to examine the manuscript, and if found acceptable to authorize their publication as text-books on these subjects, with the indorsement of this association; that the publication of the various books shall be under the supervision of committees composed of the professors in the colleges of this association of the particular branch of study to which the book is devoted, or such persons as the faculties may select; that the committee shall have power to solicit writers for the subjects named, and to require the books to be written upon a plan acceptable to the committee, and that the final copy be submitted to every member of the committee, and unless it receives the approval of at least three-fourths of the whole committee it shall not be considered approved; that each



writer shall be expected to retain the complete ownership of his manuscript and to publish it at his own expense and risk."

Several important additions have been made to our literature during the past year. Of those not hitherto mentioned in reports to this association, the following may be here referred to as the most important works:

Trouessart's "Microbes, Ferments, and Molds." "Within the covers of this unpretentious volume will be found a vast amount of practical and useful information relating to parasitic fungi and molds, ferments and artificial fermentation, microbes of the diseases in man and animals, culture of bacteria, terminology, laboratory research, etc."

Richardson's "Mechanical Dentistry." "Since the first edition was issued, now twenty-six years ago, Richardson's 'Mechanical Dentistry' has been the standard text-book both for the student and practitioner. The fourth edition, recently issued, is yet more deserving of commendation, and fully maintains the reputation in which the work has been held. It presents a faithful picture of modern prosthetic dentistry, the newest as well as the orthodox time-proved methods and appliances being plainly described in excellent text and in well-executed illustrations.

"The author indicated his appreciation of the fact that there is a growing sentiment in favor of bridge-work by devoting seventy-two pages to the subject; he also doubtless ministers to a popular want in giving even more space to the chapter on root-crowning. The subject of bridge-work is treated in a fair and unprejudiced manner, the methods employed by different practitioners being described in detail, in some instances in the very words of the inventors."

Parreidt's "Compendium der Zahnheilkunde." "This little handbook of dentistry is, in its sphere, one of the best ever issued from the press. The volume is intended for the student and physician. Careful reading of it will enable either to obtain a good general fund of information relating to the rudiments of dental science.

"The work is divided into six chapters, treating of dental anatomy and physiology, anomalies, erosion, and caries; diseases of the pulp, the periosteum, alveolar processes, maxillæ, and the mucous membrane; of filling, extraction, and also dental prosthesis; thus comprising the general field of dentistry." The work has been translated into English, with annotations, by Dr. G. V. Black. It is to be published in October.

Ostrom's "Epithelioma of the Mouth." "To the busy practitioner this little volume, by reason of its brevity, may prove very useful, because the dentist should at least be able to recognize this grave condition when it occurs in the mouth."

"The American System of Dentistry," edited by Wilbur F. Litch. Two volumes have appeared. "The work when completed will be a comprehensive presentation of the whole subject of dentistry, and until the last volume is issued a just review of the work would be impossible. We are, however, content to believe from the learning and character of those engaged in the work that the undertaking will be successful, and that it will be for a long time to come the standard work of reference of this kind in the world."

Stowell's "Microscopic Structure of a Human Tooth," etc. "This is a handsome work in the style of illustrated art publications, of portfolio dimensions. It is printed on fine, heavy paper, and the plates, of which there are twelve, are mounted on muslin guards. The illustrations are well executed, and on a scale sufficiently large to make the delineation of structural characteristics very distinct. The illustrations were all drawn in India-ink by the author, and reproduced by the engraver in such a manner that the former holds himself responsible for their accuracy. Appended is a condensed historical résumé of the progress of dental microscopy, followed by a description of the microscopic structure of a human tooth, including the dentine, dentinal canals, dentinal sheath, dentinal fibers, the granular layer, the interglobular substance, vaso-dentine, osteo-dentine, and dentine of repair; cuticula, enamel, cement, pulp, odontoblasts, and lymphatics; with directions as to methods of examining. The professional style, tone, and character of the work is to be highly commended, and whether the opinions held by the author are accepted or not, it cannot but prove useful to the student of histology."

Tomes's "System of Dental Surgery." "A large part of the work is devoted to oral surgery, as distinct from the description of ordinary operations which constitute the great bulk of the work of the average dentist. This subject is ably and exhaustively treated, furnishing the specialist in this department of dentistry with a practical and authoritative guide. The amount of labor and of comprehensive brain-power required for the treatment of each and all the subjects embraced in this system is enormous, and that it is so well done by a single mind is remarkable. But a right appreciation of the requirements of a rapidly-developing profession demands rigid and impartial criticism of a work which, making no pretension to completeness, is yet the book by which the present condition of dentistry will be judged. The growth of dentistry during the fourteen years which have elapsed since the last edition was given us, by the younger Tomes, has rendered necessary much revision and alteration. Some sections are omitted and other new ones added. There are thirty pages of matter and twenty-nine illustrations added

to the new edition. The pages and type are larger, making a book handsomer and more easily read. Terms have been in some degree changed to conform to present good usage, but the words 'fang' for 'root,' 'nerve' for 'pulp,' and 'dead' for 'pulpless,' still mar the pages and dismay those who are striving to secure the adoption of an improved nomenclature."

Ingersoll's "Dental Science." "Dr. Ingersoll's work is designed for the student, and the three chapters of which it consists are a compendium of the lectures delivered by him in the dental department of the State University of Iowa. The blank pages facing each printed page 'serve for taking notes of reading or of information derived from other sources, on the same subject as are made points of inquiry on the page opposite. Thus the work becomes a hand-book of ready reference for the office.' Taking the volume as a whole, it is very practical and useful, not only to the student, but the practitioner as well, both by virtue of its contents and the opportunity offered of recording observations and making notes for ready reference."

Taft's "Index to the Periodical Literature of Dental Science and Art." "A careful examination of the above Index will reveal to the student a mass of information which cannot be found elsewhere without great labor and a loss of much valuable time. While it is incomplete in many respects, it is of undoubted value to every dentist who may wish to know where to find particular papers on the subjects which have been written upon by various writers."

"Management of Pulpless Teeth." "The purpose of its publication is shown in the modest and brief preface: 'The Odontological Society of Chicago, realizing the want of some hand-book of reference relating to the treatment of pulpless teeth that are to remain in the jaws, sends out this monograph with the hope that it may prove of service to the profession. It purposes to detail the simple but comprehensive system of treatment, without attempting to present the various other meritorious methods which have been from time to time advocated.' The topics concerning the proceedings indicated by the title are discussed in ten chapters, and the appendix of six chapter paragraphs treats of broaches, bleaching teeth, antiseptics, disinfectants, etc."

In view of the darkness in which the histology of the periosteum has been hitherto enshrouded, a work entitled "A Study of the Histological Characters of the Periosteum and Peridental Membrane," by Prof. Black, which has just issued from the press, will be highly welcomed.

Numerous other works of minor importance have appeared during the year, and dental literature in the main has kept pace with the advance made in all of the arts and sciences.



## PART III.—DENTAL NOMENCLATURE.

On this highly important subject the Section reports but one paper as the work of the past year. To our knowledge, not a single article has appeared on the subject anywhere in our literature during that time. We do not believe that any comprehensive report on this subject can be made until it has been considered by an international dental congress. A committee was appointed by this association in 1885, and instructed to report in 1886, on the "feasibility of this association's calling an international dental congress, to meet in conjunction with this association in 1887." That committee having failed to report last year, and no such congress being convened this year, we cannot refrain from seriously recommending the formation of such a dental congress. This Section has an unusual interest in that matter. Of that branch relating to nomenclature we can only vaguely theorize, while we are totally unable to render any proper report on the subject until it has been treated as it should be by international action.

There is no definite nomenclature which is understood all over the world, and consequently there are many misunderstandings among writers of various nations, or even the same nation. Our systems of terminology and notation are simply abominable. There are no rules governing the phraseology of diseases; there is no universal system of giving the anatomical description of the surfaces of the teeth. In the present state of affairs, it is almost impossible to describe certain conditions in a sufficiently lucid anatomico-physiological manner, so that on the mind of every hearer the same ideas would be impressed. Thus, for instance: The difference of diagnosis between pulpitis partialis and pulpitis partialis purulenta may not be marked, yet the course of treatment to be adopted may vary considerably. Another example: There may be mentioned the difference existing between periodontitis acuta apicalis and periodontitis acuta diffusa, and numerous other diseased conditions, which are described by others in various terms, while aiming to convey the same idea. A system of universal notation is very desirable. The chaotic confusion now existing in this field of our inquiry is far from perfection.

Various other points in the field of nomenclature need revision or alteration, and the Section sincerely hopes that steps will be taken to arrive at the most satisfactory solution.

In conclusion, Mr. President, Section II begs leave to suggest as one of the essential means to advance the interests of the education of dentists and of dental science in general, that an international dental congress be convened at an early day, and that this associa-

tion take preliminary steps toward the consummation of that object. In an organization of that character many of the vexed questions relating to dental education or nomenclature, literature, and science could receive proper consideration, the profession from all parts of the civilized world brought into communion, and the results emanating therefrom would eliminate numerous errors, simplify many clouded theories, and raise the standard of the dental profession to a position for which all whose lives are devoted to its interest do so devoutly pray.

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## HEREDITY, CIVILIZATION, AND THE TEETH.

BY T. DWIGHT INGERSOLL, ERIE, PA.

A HISTORY of hereditary traits in man and animals would reach far into prehistoric time. The Jews and also the Romans recognized the fact that children inherit the physical if not the mental characteristics of their parents. In early times characteristics of strength and greatness of stature were perhaps more widespread than they are at the present time. Biblical mention was made of giants, and among the Romans were characteristic families known as "the *Nasones*, or big-nosed; the *Labiones*, or thick-lipped; the *Capitones*, or big-headed; the *Bucones*, or swollen-cheeked." These were regarded as abnormalities.

The Spartans practiced a system of artificial "selection" which was intended to prevent the transmission of weakness and disease, and favor the "survival of the fittest." It is supposed that conscientious scruples did not keep them from the enactment of laws for the prevention of marriage of diseased persons and those nearly related by blood, nor forbid the weeding-out of infant "tares from the wheat," to prevent degeneracy of Spartan stock. Marriages, physically unsuitable, as well as abnormal systemic states and conditions, mental excitement, and perhaps dreams, have doubtless given to the world a great variety of abnormalities and monstrosities.

"We usually find them introduced," says Professor R. A. Proctor, "without any apparent cause into a family, and afterwards they remain as hereditary traits, first inherited regularly, then intermittently, and eventually in some cases dying out or becoming so exceptional that their occurrence is not regarded as an hereditary peculiarity."

Deformities affect more often the features of the face and extremities of the human body, marring the beauty, impairing the health, and ending sometimes in premature death.

It has been said that when monstrosities appear among animals they frequently represent in some respects an animal lower down in

the scale of structural anatomy. If this be true, evolution should make use of the fact as an argument in favor of the theory of evolution. Whether the theory be true or false, it is a fact that monstrosities sometimes occur in the human family which represent in one or more features some animal lower than the human. Woman can bring into existence nothing higher than her own species. She never gave birth to an angel, nor to any being of greater complexity than that of her own organization. Dr. Owens, a physician of Somerset, Kentucky, reported on the 20th of February, 1886, the delivery of a monstrosity by Mrs. Heath which "weighed eight pounds, and had a head, mouth, and body the exact counterpart of a frog. The lower limbs were natural, but the hands were webbed and like those of a bull-frog."

This case is similar to others that have been reported within a very few years, and shows that human nature stoops sometimes very low to toy with or lift up animal pets. In giving birth to animal-like bodies there seems to be a tendency to attach to human nature those peculiarities that are most easily perpetuated. Monkey-like faces, bull-dog projecting lower jaws, dog-men with hair all over the face and body, are some of the phenomenal births that are the result of heredity; and the object of the present inquiry is to ascertain if possible what effect they have had on the formation of the dental organs, and by what law or influence any effects which may have been found have come into existence.

A few years ago Andrian Jechtichjew and his son Fedor were on exhibition in London and Paris. They were called "dog-men, the father's face being so covered with hair as to present a striking resemblance to a Skye-terrier. . . . In color this is of a dirty yellow; it is about three inches in length all over his face, and feels like the hair of a Newfoundland dog. The very eyelids are covered with this long hair, while flowing locks come out of his nostrils and ears."

The father was at this time about fifty-five years of age, and the child about three. Andrian has had but six teeth,—two incisors in the upper and four incisors in the lower jaw. Andrian's case is particularly interesting, as a redundancy of hair is accompanied with a deficiency of teeth, and Prof. Proctor has called attention to the supposed fact that "a constant relation exists between hair and the teeth." Such a correlation between hair and teeth cannot be accepted as a law which will certainly prevent the development of a full set of teeth where there is an excess of hair, for sometimes a hairy coat is seen with a redundant set of teeth. The correlation implies merely that any cause that stimulates an excessive growth of hair may interfere with the normal development of the teeth. It



is said that both hair and teeth arise from the same or a similar source, and, if it be true, we may therefore infer that the supply of material and degree of life-force were not sufficient to cover the body with hair and fill the mouth with teeth. Had the mother's system been in a normal condition in every respect, such a birth would not probably have occurred, for there is no evidence that it happened through heredity, and it must therefore be attributed to the peculiar condition of the mother. Prof. Virchow made careful inquiry into the history of this family, and so far as could be learned "Andrian was the first in whom this wonderful hirsuteness had been noticed. Neither his reputed father nor his mother presented anything of the kind, and a brother and sister of his who were still living were in no way remarkable for capillary development."

The son's case is not exactly like that of his father, the commencement of whose existence was a wide departure in one respect from the species to which his parents belonged. The birth of the son is an inheritance of a disgusting abnormality through heredity which should not be confounded with specific type, as some writers in dental journals seem to have done. If the doctrine of evolution be true, the son's inheritance of a hairy skin may be regarded as a *mark* of man's lowly origin, reminding him that he is not yet entirely divested of his animal-like nature.

An account of Shwe-Maong, who was about thirty years of age, and the head of a Burmese family living at Ava, was first published by Crawford in 1829.

"His whole body was covered with silky hairs, which attained a length of nearly five inches on the shoulders and spine. . . . Shwe-Maong retained his milk teeth till he was twenty years old (when he attained the age of puberty), and they were replaced by nine teeth only,—five in the upper and four in the lower jaw. Eight of these were incisors, the ninth (in the upper jaw) being a canine tooth."

In this case it may be imagined that the mother imparted an unusual amount of vitality to her child, which was retained by him till his first teeth were all erupted, when he seemed to lose organic energy, so that adult life did not occur for several years after the usual time. The idea of correlation is so much complicated with other organic phenomena that its application in this case is almost valueless; nor is it of any worth when applied to Julia Pastrana, in whom Mr. Darwin was much interested as a study in natural history. This woman was "a Spanish dancer or opera-singer who had a thick masculine beard and a hairy forehead, while her teeth were so redundant that her mouth projected, and her face had a gorilla-like appearance."

This woman had a redundancy of teeth instead of a deficiency, showing an entire want of correlation. The forces that were in action for the formation of teeth must have been in a state of undue excitement, as well as those for the production of hair, causing an aberrancy of organic energy, and the overstepping of normal limitations.

A few years ago the feet of a giant were given a young woman in Ohio, and a pair of like size was set under a colored man in Indiana. There are other life-phenomena of common occurrence which may be attributed to differences in physiological action at different periods. The sixth-year molars, when badly decayed soon after eruption, indicate a physiological condition which was too weak to produce for the molars anything more durable than that given to the deciduous teeth. Other classes of teeth are often prematurely decayed while the balance in the same mouth remain apparently unaffected. On this principle we may perhaps account for a difference in color between the hair of the head and the beard. There is also a difference in time of growth between the hair on the head and that which grows on other parts of the body. A boy with black hair may in time get a red beard. A gentleman in this city has light yellowish hair with a dark reddish-brown beard. It is a noticeable fact that the beard very often becomes gray sooner than the hair on the crown of the head, and with the aged there seems to be renewed energy manifesting itself in a new growth of coarse, white hair in the ears and nostrils; the eyebrows get "wild" with straggling, long hairs, turning up toward the forehead, or bending down before the eye; and some portions of the body previously smooth become more or less shaggy with hair near the close of life.

Organic energy is sometimes weak and sometimes strong. It has a constant warfare to maintain against some of the forces of the physical world, to which it seems to succumb when a child is born with an organization partly animal and partly human. Phenomena of this character sometimes pass over two or more generations before reappearance, but reversion is sure to follow, as is the case with other monstrosities that are immediately transmitted, because the law for the preservation of species dominates the tendency to atavism.

As the physical world came first into existence, it would seem that it considers the organic world an intruder, which must be destroyed.

One of the phases of evolution is seen in attempting to destroy monstrosities, and everything that it cannot nobly build up and improve. Monsters are generally brought to an untimely grave, and organic energy triumphs at last by reverting back to the original type, and declaring that "species shall never die." Life-forces manifest

sometimes more potency in one or more parts of an organism than in others, while other beings are deprived entirely of one or more organs. The organic has had a combination of powerful forces to resist, and whole species of animals and plants have become extinct.

The peculiarities herein mentioned, and hundreds of others, show that nature descends sometimes to a lower and baser level, where nondescript beings are brought apparently into existence as a means of recreation. Freak-work of this character acts unfavorably, not physiologically merely, but psychologically also, dampening higher aspirations to a more perfect organization and to a life of nobler modes of thought. Beings are sometimes afflicted with one or more abnormal organs which are inherited by their descendants, and remain as permanent imperfections. This is in accordance with unconscious heredity; and it is believed that heredity, the evil results of civilization, and *some* of the many *alleged* causes of decay have been the means of the present deteriorated condition of human teeth. What means can be used for the prevention of dental abnormalities is an unsolved problem. It may be suggested that part of the evil might be suppressed perhaps by judicious legislation for the prevention of marriage by diseased persons and by those nearly related by blood. As natural selection has failed to improve the masticating organs, it might, in time, effect an improvement on the principle of the "survival of the fittest;" but such a scheme would require coercion, and that would not be tolerated by the people. The profession, however, may effect some good by giving wise instruction to their patients, performing scientific operations on the teeth, and imparting information to the public through the press.

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## A NEW METHOD OF CROWN-SETTING.

BY SIDNEY S. STOWELL, D.D.S., PITTSFIELD, MASS.

(Clinically presented at a Union Meeting of the Connecticut Valley and Montreal Dental Societies, a Montreal, Canada, July 19-23, 1887.)

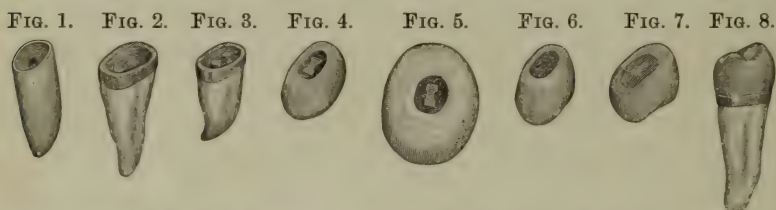
HAVING treated the root with suitable disinfectants, I make sure that the foramen at the apex is thoroughly filled; lead being used if the foramen be large and open; otherwise I use oxychloride of zinc. This having been done, no trouble will follow from the drilling and reaming of the root, which would otherwise force particles of matter through the foramen.

The dressing of the root I do with a wet corundum-wheel, an inch in diameter and one-eighth of an inch thick, revolved in the engine, to face down the end; and to trim it for the band I use the set of scalers known as Chappell's small scalers (Fig. 175, page 291, "American System of Dentistry," Vol. II), manufactured by



the S. S. White Co. By my suggestion two of these scalers, Nos. 61 and 62, are curved in the opposite direction. Having squared off the end of the root and made its walls perpendicular, I now countersink the end (Fig. 1), using for that purpose a large round bur in the engine. I now make a closed cap, using the combination crown metal, and place it upon the root. The cap is then perforated and the root reamed for the dowels. The bite in wax is now taken, after which the cap is burnished into the countersunk end of the root (Fig. 2). The dowels of platinum and iridium wire are now set in their places, being allowed to project one-fourth of an inch so that they may adhere to the impression of plaster which is then taken. From this a cast is made of investing material; calcined marble-dust and plaster is preferable, though fine molding-sand will do. The dowels are now cut off even with the top of the cap (Fig. 3).

The tooth to be used may be a Logan or an E. Parmlly Brown crown, or a common countersunk tooth, but I would in most cases recommend the Logan crown. As the case in question is a bicuspid, I

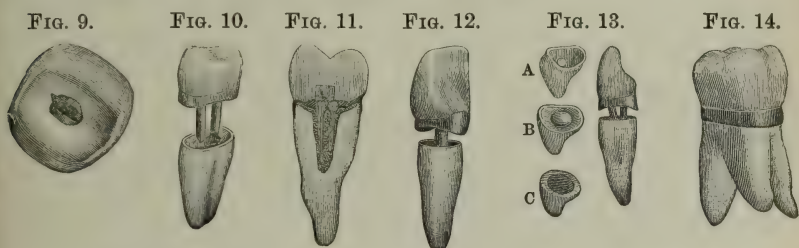


have selected for it a Logan crown. First, I cut off the pin, and then the tooth is ground into position on the cap; grinding the stump of the pin and porcelain alike evenly and smoothly. The stump of the pin is now ground with a small wheel below the surface of the porcelain (Fig. 4). The tooth is now invested (Fig. 5), and pure gold fused on to the platinum pin, and while in a fluid state it is with a wax spatula spatting down flat (Fig. 6). The gold is now filed or ground down even with the porcelain, and at the palatal border the tooth is ground to bevel back until the gold is reached (Fig. 7). The tooth is now fastened in place on the cap with wax cement (Fig. 8), the cast cut away, and the case invested in asbestos and plaster (Fig. 9). This is used because of the fiber of the asbestos, which prevents the separation of the crown and cap. The case is now heated until the wax has melted and burned out; a small clipping of thin platinum plate is crowded into the opening (see Fig. 9) caused by the grinding of the bevel on the crown. The clipping of platinum serves as a lead for the solder, which follows it down into the countersunk cap, around the ends of the dowels, and finally attaches itself to the pure gold already firmly attached to the stump of the platinum pin. When cool the case is removed from the invest-

ment, dressed and polished, and the work is done (Fig. 10). A sectional view of a like tooth (Fig. 11) shows the organization in detail.

Fig. 12 shows a central incisor root on which a Logan crown is used after my method. Fig. 13 shows how delicately an operation of this kind may be performed upon an inferior central incisor, by the use of the countersunk tooth-crown, which is shown as it appears before gold has been melted in its cup around the pin, A; when the cup has been filled with gold, B; and after the crown has been ground and beveled, C. A counter-sunk molar crown is shown as likewise mounted on the roots of a superior left second molar (Fig. 14).

The cuts are made from photographs of prepared specimens, the natural roots of which vary in the several figures; and in the section (Fig. 11) the continuation of the pulp-canal does not appear, because obliterated in preparing the section.



The claims for this method of crown-work are as follows: The combination of an all-porcelain crown with a closed cap and dowels; the adaptation of which crown and its final attachment to the root can be made perfect.

The dowels may be set at any angle that the direction of the root-canal may indicate, using one or more dowels as the case may require, and when the root has to be cut off much below the gum, and a collar cannot be placed, a platinum disk-floor on the root-end is the preferable plan. The well known and easily detected plate-tooth having a gold backing which renders the tooth dull in appearance is thus made obsolete, for this crown possesses the translucent appearance of the natural organ. Best of all, the glaring gold of which some so-called beautiful crowns are almost entirely composed is by this means superseded. I here refer to gold bicusps and molars, more especially to the former, which have always been an eyesore to me, and it was the unsightly appearance of these which first led me to try and improve on them.

While I recognize the unquestioned value of the closed cap and dowel, I respectfully present to the profession a supplemental

method which results in a crown possessing all the merits of the former with the additional embodiment of strength, beauty, and practicability.

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## PROCEEDINGS OF DENTAL SOCIETIES.

### AMERICAN DENTAL ASSOCIATION.

#### SECOND DAY.—*Morning Session* (Continued).

(Continued from page 561.)

SECTION III, Operative Dentistry, was called, and Dr. E. T. Darby, Philadelphia, chairman, read the report, which, while regretting that the Section had no papers to present, and recognizing the fact that in the opinion of some of the members the only proper subjects for consideration in the American Dental Association were the results of original investigation and scientific research, called attention to the fact that science had as yet done little towards the saving of human teeth, while practical operative dentistry had done much. The reason why American dentists were in the vanguard of their profession was that they were practical as well as scientific, and so were not ashamed to discuss the practice as well as the theory of their calling. Last year an attempt was made to get the opinion of the Association on some methods that had been long in vogue, but nearly the whole time allotted to the Section was consumed in discussing the Herbst method. Has the experience of those who adopted it been such as to warrant them in continuing its use? It had certainly done much good in stimulating manufacturers to produce a superior quality of gold. The Wolrab gold which it brought forth was the incentive which produced the "velvet cylinders," and a better preparation of gold it would be difficult to find. Much attention has been given of late to simplifying operations upon approximal surfaces. The various forms of matrices and separators which have been devised have done much to render difficult operations easy and reduce the time necessary for their performance; so that teeth can be separated and restoration of contour effected with much less pain to the patient and far greater ease to the operator. The implantation of teeth, as suggested by Dr. Younger, of San Francisco, has interested the profession not a little during the year, and the experience of those who have tried it would be valuable.

What was most needed now was a reliable plastic material embracing all the essential qualities of a filling, and requiring only a few moments for its insertion. Another great need was a safe and reliable remedy for obtunding sensitive dentine. A blast of warm



air at a temperature of 90° to 100° F. does as much as anything yet suggested for this purpose, and what was required was an apparatus so constructed that compressed and warmed air of a given temperature might be conveyed directly to the cavity.

The Section recommended the presentation by Dr. W. N. Morrison of his method of correcting irregularities; also a few cases of transplantation and implantation of teeth by the same gentleman; and cases of regulating by Dr. S. C. G. Watkins and Dr. W. C. Barrett.

Dr. W. N. Morrison, St. Louis, described a new device for holding rubber-dam in place during operations. He had often found it difficult to get down with the rubber to the cervical margin between the teeth in certain cases, until he accidentally stumbled across the idea of using a narrow strip of the same rubber-dam as a ligature. By taking out the stretch after the dam is started down between the teeth it will go readily to the cervical margin; then clip off the ends and it holds securely. One advantage about the rubber ligature is that it does not cut the dam as the silk sometimes does.

Dr. A. L. Northrop, New York, would ask why, if a cavity with sharp edges would cut the dam as ordinarily secured, it would not do so when the dam was put down in this way.

Dr. Morrison replied that where the edges of the cavity are sharp they are to be cut away, but he had referred to the cutting of the dam by the ligature itself.

Dr. Morrison then proceeded to explain his system of treating irregularities. At the Cincinnati meeting of the association he had presented his method, which consisted essentially in assisting nature. He had taken the ground, and practiced on that theory for many years, that irregularities should be prevented; that the deciduous teeth should be kept in position or allowed to remain until pushed out by their successors. He showed casts exhibiting the results of the treatment he advocated. One case described was that of a little patient, five years old, sent to him by a physician, with a request to extract certain teeth. Four premolars were badly decayed, with dead pulps; the anterior teeth were also decayed. The teeth were filled and kept in place until their successors erupted, without irregularity, which would certainly have existed had the temporary teeth been extracted at the time he first saw the case. Casts were also shown of a case of irregularity treated for a patient fourteen years old. This case was treated with jack-screws and platinum bands, which were first applied to the upper jaw, then to the lower. The irregularity in the lower teeth was corrected in three weeks; treatment of the upper teeth was not yet completed. In

another case the left superior lateral closed within the inferior. By adjusting a jack-screw to a molar and bicuspid of the opposite side of the jaw, and a platinum band to the lateral, the difficulty was corrected in eight days.

In the case of an unerupted right upper cuspid he found a space between the lateral and first bicuspid of one-sixteenth of an inch, and just above it the point of the cuspid was found. He enlarged the upper arch, and when sufficient room had been made, using cocaine to deaden sensation, he bored from the outside of the jaw, and attempted to bring the cuspid down; but instead of coming down, as he expected, it would go right up into the jaw. He then extracted it, and found it had a crooked root with a decided hook at the end. This was cut off, and a crooked socket bored and the tooth replanted and fastened in place. It had been a complete success.

Dr. S. C. G. Watkins, Mont Clair, N. J., described the case of a young miss of thirteen whose lower anterior teeth closed entirely outside of the uppers. [For full description of this case and details of treatment, see the DENTAL COSMOS, September, 1887, page 599.]

(To be continued.)

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### SOUTHERN DENTAL ASSOCIATION.

THE nineteenth annual session of the Southern Dental Association was held at the Hygeia Hotel, Old Point Comfort, Va., commencing Tuesday, August 30, 1887.

President W. W. H. Thackston, of Farmville, Va., in the chair.

#### FIRST DAY.

The sessions of the first day were devoted principally to routine business. In the unavoidable absence of Governor Lee, who was to have made the address of welcome, President Thackston, in a few well-chosen words, bade those present welcome to the soil of Virginia. Dr. J. H. Prèwitt, of Kentucky, responded in an eloquent manner, and was followed by Dr. V. E. Turner, of Raleigh, N. C., who in the name of the Southern Dental Association greeted those who attended as guests.

President Thackston read the annual address. Dentistry as a science, he said, had made itself; or, to be more exact, it was evolved and built up by dentists with little of help from outside their own ranks, until it was now acknowledged and accepted not as an appendage to another profession, but as a full-grown profession of itself. This being the case, he would not rake up the old quarrel with the medical fraternity. Can medical men be blamed for their

refusal in the past to acknowledge dentists as professional brethren when so many of the latter were persistently violating the rules which should govern professional gentlemen? In the coming meeting of the International Medical Congress dentists would meet with the medical men to teach and to learn, and in every department they could give a full equivalent for all they would receive. He then traced the mutual interdependence of the dental colleges and the dental associations. The growth of our educational system since 1840 has been simply phenomenal, so that he believed the facilities for obtaining an education were now in excess of the demand. The chasm between medicine and dentistry had now been bridged over, the recent action of the American Medical Association having wiped out the last line of demarkation between them. Another feature not to be overlooked is the need of associations as regulators and supervisors of our growth. All human enterprises have their weaknesses, and require regulation. No one or two bodies can accomplish all that is necessary. Hence has come the organization of local societies, and the whole domain of our country has been divided among a few representative bodies, and of them the Southern Dental Association is the one to which we owe our first fealty. The American Dental Association has done a great work, as witness the establishment of the large number of colleges. The Southern Dental Association has a great work before it. Our educational facilities must be maintained and increased; our literature must be improved; the demand for increased skill must be met and answered. These are the work of the association.

Drs. J. B. Hodgkin, J. Rollo Knapp, and R. R. Freeman were appointed a committee to prepare a memorial to the late Dr. J. R. Walker, of New Orleans. The committee reported at a subsequent session, and on motion a page in the transactions was set apart in honor of the deceased.

The opening hour of the next day's session was assigned to Dr. A. E. Baldwin, of Chicago, to read a paper which he had prepared at the request of the executive committee.

#### SECOND DAY.—*Morning Session.*

The association met at 10.25 A.M., President Thackston in the chair.

Dr. A. E. Baldwin, Chicago, read his paper entitled "Immediate Root-Filling." Following is an abstract of the paper:

While not condemning pulp-capping, the writer believed that as a rule in real pulp-exposures the better plan is to devitalize, remove the pulp, and immediately fill the roots. The usefulness of the pulp



has been mainly accomplished when the tooth is fully developed; so he would try harder to save the pulp alive in the child than in the adult; but when caries has invaded the tooth sufficiently near to the pulp to cause long-continued or frequent attacks of pulpitis, the tooth is best treated by pulp-devitalization and immediate root-filling. A large majority of abscessed roots may be properly filled immediately. In treating teeth with dead pulp, he cleans out and dries the tooth, cuts away so that free access is had to the pulp-chamber and root-canals, and with shreds of cotton on piano-wire broaches cleans out as thoroughly as possible all the contents from these openings; then sometimes wipes out the canals with a 95 per cent. solution of carbolic acid, following it after partially drying with alcohol; but oftener simply wiping out with the alcohol, on account of its affinity for the water in the canals and interdental spaces. Then comes the main treatment by hot air, to thoroughly desiccate or dry the canals and dentinal tubules. When thoroughly dried—and upon the thoroughness or failure of this hinges the success of the operation—the filling is begun. For filling-material, it matters not specially what is used, provided thorough dryness is secured and the filling-material hermetically seals the canals and tubuli, and is non-irritating. That which meets these wants more nearly than any other, in the writer's opinion, is a solution of base-plate gutta-percha in chloroform, about the thickness of cream. This is pumped in with a fine broach of piano-wire, roughened by rolling on hard wood under a fine file, and then wound with a shred of cotton. Sometimes the entrance is reamed out. When the canal is filled, wipe out the excess in the pulp-chamber, and, heating a small piece of base-plate gutta-percha, place it over the opening, and with fine-pointed instruments force the contents to the uttermost limits of the canal and tubules. Then fill the pulp-chamber and proceed to fill the teeth. In cases where pericementitis follows—very rare—his treatment is to dry the gum over the affected root and apply on a pledget of cotton equal parts of tincture of iodine and tincture of aconite root. He has never had trouble with any freshly-devitalized tooth by this method, though he waits from a week to ten days after devitalization before removing the dead tissue, so that it may slough from the living tissue. In a few cases where there was a constant discharge through the foramen he has sealed in a small shred of cotton saturated with a 95 per cent. solution of carbolic acid for a day or two. Teeth having abscess with fistulous opening are immediately filled; those having blind abscess are opened if sore, loosely filled with cotton to keep débris out, and left for a day or two for the soreness to subside; then cleaned and filled as before.

The writer thinks micro-organisms an unimportant fact or in the production of pus. A felon on the finger or acute synovitis of the knee-joint will convince thinking men that the micro-organisms of the air are not necessary to produce pus.

Dr. M. C. Marshall, Little Rock, Ark., read a paper on "Conservatism in the Selection of Filling-Materials," in which he said the usefulness of a filling-material depends so largely upon its proper selection that much consideration should be bestowed on this often neglected step in the operation. He who would serve his patients best must adopt a conservative course. If his judgment conflicts with the wishes of his patient, he should have the courage to carry out his convictions or allow the patient to seek some one less honorable. It is simply mechanical to introduce the material properly; artistic to reproduce nature; but scientific to determine what is best for any given case. The operator should be thoroughly acquainted with tooth-structure and its power to resist force. Constitutional tonicity, age of patient, and position of cavity are also to be considered. It is certainly unwise to subject weak, nervous patients to a protracted gold operation in a molar, or to fill young children's teeth with gold except in rare cases. Proper knowledge of the peculiar advantages of the various filling-materials is not taught in all the dental colleges. In the selection of our filling-materials, the electrical probabilities as regards recurrence of decay should be given less consideration than a careful, conscientious selection of that which will be best for the case in hand. In the "American System of Dentistry" it is stated that some teeth are so soft that they cannot be saved; that there exists sufficient moisture in them to continue the process of decay. The writer had never seen disintegration going on under a properly inserted zinc-cement filling, nor had he found anyone else who had. Many operators deny themselves and their patients the advantages of amalgam because they look upon it as unworthy of their consideration. The profession has a duty that transcends any hobby; there is a higher plane than that attained by taking every opportunity to exercise our skill in the manipulation of gold; and which is most fully enjoyed by those who never permit the esthetic to dominate the ethic.

#### *Discussion.*

Dr. Geo. H. Winkler, Augusta, Ga., thought the reliance placed by Dr. Baldwin on carefully drying the cavity—desiccation—was worthy to be adopted by everyone; that is the bottom principle of the treatment of roots. He did not agree with the method of filling roots advocated by the writer, because a portion of the gutta-percha

might be forced through the apex and cause trouble. Gutta-percha, lead, or tin points were preferable for this purpose. Immediate root-filling in the speaker's practice was confined to those pulps which he devitalized by driving a wooden peg into them. In these cases the canal is cleaned out as thoroughly as possible,—there is only slight hemorrhage,—wiped out with alcohol, and filled with one of the points mentioned. Sometimes, where these are not applicable, he fills with iodoform and creasote. His treatment of dead roots was to clean out as thoroughly as possible, dry, and, after opening freely, to inject peroxide of hydrogen until it comes out without bubbling; then, after wiping out and drying thoroughly, to pass up the iodoform and creasote or carbolic acid before filling. He was sometimes afraid to fill this class of roots immediately, and generally treated at least once first.

Dr. John C. Storey, Dallas, Texas. One would be led to believe from the paper read that all pulp-canals were as big as gun-barrels and as straight. Down in Texas this was not the case. Many pulp-canals were crooked and so small that they couldn't be entered with an instrument to get out the débris. The speaker cleaned out canals as thoroughly as he could, but he did not always fill all the canal. He filled them with oxychloride first, last, and all the time, and he never lost the teeth whose roots were so filled, so far as he knew, and he had been practicing that method for twenty years. He might have had failures, but if he had they had gone to the "other fellow." Where a fistulous abscess existed he pumped oil of cloves through the fistula, and then filled the root at once with the oxychloride. In cases of blind abscess he runs a drill through the process to the sac, and then fills with oxychloride.

Dr. L. G. Noel, Nashville, Tenn., was a profound skeptic as to the necessity of dryness in the root-canals. All dentists recognized the necessity of a thoroughly aseptic condition of the parts, but as to desiccation, with the hot-air syringe for instance, he did not believe the canal would stay dry if it could be got thoroughly so. Will not the fluids find their way back?

Dr. C. Edmund Kells, Jr., New Orleans, thought that if the canal was thoroughly filled the fluids would not get back, as both the fluid and the filling could not be in the same place. He did not fill all canals. When the canal was so fine that the finest Donaldson nerve-bristle would not penetrate it, it did not need filling; but if a bristle would penetrate it should be filled. The best material, in the speaker's opinion, when the apex was large enough to permit its use, was carbolized orange-wood. After getting this into place, pump in oxychloride; something should be put up to seal the opening, and oxychloride had been the most satisfactory with him.



After this was done the canal might be filled with whatever the operator willed. There was no reason why the root should be treated. The cause of the trouble was the pulp, and this might just as well be removed in a half hour as in four hours. Abscess, when it existed, could be treated as well after as before the root was filled. He thought he should use carbolic acid, pure.

Dr. J. Rollo Knapp, New Orleans, remarked that two of the gentlemen who had spoken never had failures. Every now and then the speaker had a failure in root-filling. In regard to the use of pure carbolic acid, it should be remembered that pure carbolic acid is in crystals, and the solution which is nearest to the pure acid is about 95 per cent. He thought that wood by itself was not best for filling canals. In conjunction with it, or with pellets, or with tin or lead points, or with gold, he should use a solution of gutta-percha, and sometimes oxychloride of zinc. Fluid and solid materials should be used together, as thus the solid filling would push the fluid into all the interstices.

Dr. Winkler said he had evidently been misunderstood, from what had been said to him by gentlemen in his vicinity. He never used gold in root-filling, and he never saw tubuli big enough to let the filling-materials into them.

Dr. W. H. Morgan, Nashville, thought the paper one of the best he had ever heard, though he would take issue with the writer on one or two minor points. If the root-canal is crooked, it is not necessary to go straight to get at it. There is always a way to get around the corner. The trouble with a pulp abscessed or devitalized slowly is from putrefaction. There is no putrefaction where there are no fluids. Any process which will prevent putrefaction will prevent blind abscess. The fundamental rule in surgery is to remove the cause of the trouble, and the cure will usually be easy. When the parts become so reduced by reason of long continued trouble that they cannot recuperate, amputation may be necessary; or encystment may occur. Some root-canals were too small to be filled. These the speaker enlarged, and he attributed his success in treating them to this enlargement, as he apprehended that the operation removed the cause of the decomposition. If able to reach the tubuli with hot air and desiccate thoroughly, decomposition, the cause of trouble in the root, is obviated, and at the same time the discoloration which is caused by disintegration and change in the elements is prevented. He questioned whether it was possible to dry out the tubuli, and there was no gauge given by which to tell when it was done. He should rely on antiseptics mostly, but would use hot air as an adjunct. Dr. Baldwin's method of treatment was objectionable, because some of the fluid might be

forced beyond the end of the root and set up irritation, in which case inflammation was sure to follow. It might be that gutta-percha was so little offensive that nature would encyst it. He did not think it would break down and carry it off in the circulation under such circumstances, but it must be got rid of in one of three ways: absorption, ejection, or encystment. In the treatment of pulpless teeth, where there was abscess the cause should be got at. If there was decomposed matter in the canal, it was only necessary to open up, wash out thoroughly, and use an antiseptic. He could not see what use a disinfectant would be if the contents were already decomposed. The sealing spoken of in the paper would not prevent decomposition, which cannot occur unless there are micro-organisms present. In blind abscess germs are found floating around in the blood. He believed the later experimenters were inclined to the opinion that there was no abscess without the existence of pus in some part of the blood. The tubuli anastomose with the canaliculi, and thus while one end was sealed the other might be open.

In reply as to whether he always destroyed exposed pulps, Dr. Morgan stated that he did not.

Dr. T. T. Moore, Columbia, S. C., thought the gentlemen might learn a lesson in the treatment of roots from the paper, and also from one read before the American Dental Association some years since. By using gutta-percha and pumping it in, in conjunction with tin, lead, or wood points, the canal could be so fixed that the root would give no further trouble. He would like to ask Dr. Winkler whether the operation of driving a peg into a living pulp was not very painful?

Dr. Winkler replied that it was not; he considered it one of the best operations in dentistry. Persons who had never seen it done could not know how little pain it caused and how satisfactory it was.

Dr. W. H. Richards, of Knoxville, Tenn., thought the gentleman from Chicago, in waiting a week or ten days after devitalizing before removing the remains of a pulp, made work for himself. It might be necessary, sometimes, to get rid of suppuration. When the roots were straight the speaker had been in the habit of placing the arsenical paste in at say eight o'clock in the morning, and allowing it to remain till noon, when he could remove the pulp with very little pain. He did not see the necessity of drilling to the end of the root, and he thought it doubtful practice, as he had seen much trouble from the drill going through the side of the tooth.

Dr. Ernst Sjöberg, Stockholm, Sweden, to whom the courtesies of the floor had been extended, would like to say a word about Witzel's

method, which was largely used in Sweden and Germany. It was applicable where the pulp was congested but not disorganized, when the canals were difficult. The first day the pulp was cauterized with the arsenical paste; the next day the cavity was opened largely, and the coronal portion of the pulp removed with an excavator or a clean new bur in the engine. There was a little pain when the bur was first put in, but afterwards none. The openings to the roots would frequently bleed. This should be stopped—any means would do; then a small pellet of say oxychloride paste put over them, covered with a platinum cap, and the chamber filled with oxychloride or amalgam, as deemed best. The important thing was to amputate the large portion of the pulp. Witzel had treated some thousands of cases in this way; the speaker had had some hundreds, and good success attended the operation. He tried to fill root-canals when he could, but he had had very few failures when he treated by the Witzel method. One most important measure was to see that the instruments and everything used in the operation should be perfectly clean; it was desirable to dip the instruments in carbolic acid.

Dr. H. J. McKellops, St. Louis, thought this question almost threadbare. Dentists had been at the work of filling roots a long time, but still there was a want of success. He had yet to see the man who could say honestly that he made an absolute success of it. Every man who knew anything about it knew that it was often a very difficult matter to devitalize and extract the pulp from root-canals. In some roots it was easy; in others he defied any man to get them out,—say in the buccal roots of molars, where a barbed broach could not be got. What made alveolar abscess form about a tooth-root after we have done our best to fill the root, and think we have succeeded? The gentleman from Chicago said one or two remedies were sufficient for the dentist's needs. The speaker thought the materia medica of dentistry was a big field; and chemistry, too, was to be considered in these cases. Abscess might be caused by microbes, or chemistry might be involved. He had specimens of all kinds of root-fillings, and they smelled very sweet. All have their methods; they had heard him describe his at former meetings, and it was scarcely worth while to consume time going over it again. Some might be successful their way; he might succeed his way,—at least he might think so,—but because apparently there was no after-trouble which came to him for relief he could not assume that success was assured every time.

Dr. H. E. Beach, Clarksville, Tenn. Dr. Baldwin says he waits ten days after devitalizing the pulp for the separation of the dead from the living tissue. The speaker's experience, and that of others



would bear him out, was that when the application was made it might destroy the pulp-tissue right up to the foramen, or it might extend up to within one-eighth or one-sixteenth of an inch of that point, and in this latter case the stump that was left would often become inflamed and sensitive. The method of stabbing the pulp spoken of by Dr. Winkler was much better. Waiting ten days only increased the difficulty, and the speaker would prefer immediate filling, or at furthest the next day. Some of the gentlemen objected to enlarging the canal. He thought an advantage was gained in enlarging by shaping it up so that it would be round; one reason for this being that he preferred a metallic filling to any vegetable. He used lead, and believed it was the best material ever employed for filling root-canals, after an experience of seventeen years in its use.

Dr. Geo. Evans, New York City, asked attention to a device he had invented for supplying hot air to allay sensitiveness of dentine and for drying out canals, which he would exhibit in the clinic rooms.

Dr. McKellops. Dr. Herbst had introduced a gold and platinum broach, which on account of the strength and character of the metals used could be made very thin, barbed slightly, and used in canals which were too small for steel broaches.

Dr. A. Eubank, Birmingham, Ala., used alcohol and wound up with chloroform in root-canals. This united with the fluids present and enabled him to dry them thoroughly.

Dr. C. S. Stockton, Newark, N. J., thought the great difficulty was that there was no fixed way of treating roots. He was interested in the method described by the gentleman from Georgia of "knocking out" (there was no better term to describe it) the pulp, and thought it much better than putting in a preparation and letting it remain—one speaker said four hours, another ten days. The hurt was very slight if the patient knew what was to be done, but it would be cruel to take them unawares. He would be delighted if some sure way of treating roots could be devised, but he did not believe in immediate filling. Mischief might be done, and he preferred to put in a temporary filling; the patient would be no worse off by waiting. He believed with Dr. Baldwin that heat was the great thing in the treatment of the roots.

Dr. W. W. Allport, Chicago. In the treatment of pulpless teeth their anatomy and their anatomical connections must be taken into consideration. If the root-canal and its contents were placed in such condition that decomposition would be prevented, it made no difference what the canal was filled with. It was important to keep the pulp alive when it could be done, but when it had to be

removed the tubuli should be placed in as healthy a condition as possible. As far as possible their contents should be removed, for which purpose heat was probably the best agent, and next to it peroxide of hydrogen. For the application of the heat the hot-air syringe was of little good; there was nothing so good as a heated wire, which should be inserted and allowed to dry out the canal thoroughly; then peroxide of hydrogen should be injected, and the injections kept up until no more gas was evolved. Then came the filling of the tooth. If the foramen was perfectly sealed there would be no trouble. Alveolar abscess in nineteen out of twenty cases was not around the tooth, but beyond it. There was not one case in a hundred where the root was within the abscess unless the abscess had worked its way down from above. In regard to the filling-material, Dr. Baldwin spoke of gutta-percha as the best. In some respects it might be, but there was more or less shrinkage if used with chloroform, and more or less porosity. The speaker used oxychloride of zinc in a semi-fluid form, and he filled the chamber full. After putting oxychloride in the root he forced up a wood plug, then withdrew it, and kept on until the root and chamber were full; then he wrapped gold on a broach and worked it up gradually as far as it could be got. He could see no object in using wood to fill the canals, unless to be different from others, though the elder Dr. Kennicott used it thirty years ago. [Dr. Allport showed and described an instrument for the application of heat, devised by a gentleman in Chicago, somewhat similar to a device by Dr. G. Evans, described at page 167, DENTAL COSMOS for March, 1887. In Dr. Evans's device the broach-like continuation was silver, and in this it was copper.]

Dr. Morgan. Forty years ago a gentleman named Griffith used an instrument like that to destroy pulps. Upon the subject of drying dentine it must be said that we don't know how sensation is transmitted; but a fluid is necessary. If the dentine is thoroughly dried, living teeth can be cut without pain.

Dr. B. H. Catching, Atlanta, Ga., thought Dr. Baldwin used his solution too thin. He liked it about the consistence of putty. Used in this state, by dipping the instrument in alcohol, it could be pushed as far as needed without difficulty, and there was less contraction than when mixed thinner.

Dr. Baldwin wished to correct some misapprehension as to his views. One of the speakers had charged him with making an invariable rule to devitalize exposed pulps. What he stated in the paper was that he thought the better treatment, as a rule, was to devitalize. No invariable rule could be laid down. He did, as a rule, wait a week or ten days after devitalizing before removing the re-

mains. He had found it better practice to wait until the line of demarkation was set up. His position on the number of remedies necessary had also been mis-stated; he did say a few remedies were enough, because it would be found that their uses were numerous.

Dr. R. R. Freeman, Nashville, Tenn., thought lead one of the best materials that had ever been used for filling roots, and he advised all who had never tried it to do so at the first opportunity after going home. There were men all over the country who did not use it, but he had been using it for seventeen years, and he had yet to see one case in which he regretted it. Many pulps were so tenacious of life that they could not be killed. Why not let them remain? He tried to preserve them, and, when that could not be done, to let them die as easily as possible.

The subject was passed.

Adjourned to meet at 3 p. m.

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The annual election was held Friday, September 2, 1887, and resulted as follows: B. H. Catching, Atlanta, Ga., president; J. H. Prewitt, Madisonville, Ky., first vice-president; W. N. Morrison, St. Louis, second vice-president; J. Hall Moore, Richmond, Va., third vice-president; J. Y. Crawford, Nashville, Tenn., corresponding secretary; L. P. Dotterer, Charleston, S. C., recording secretary; H. A. Lowrance, Athens, Ga., treasurer; C. E. Edwards and B. Oscar Doyle, Louisville, Ky., and W. McL. Dancey, Jacksonville, Fla., executive committee.

At the late meeting of the American Dental Association a resolution was adopted inviting the Southern Dental Association to hold a union meeting with them, and the officers of the American association were appointed delegates to attend the meeting of the Southern Dental Association to arrange the time and place. Five of the committee were present, Drs. Harlan, Waters, McElhaney, Shepard, and Wardlaw. A similar committee, consisting of Drs. Knapp, Chisholm, Catching, Winkler, and Storey, was appointed on behalf of the Southern association. The joint committee unanimously agreed upon the following report:

The committee appointed to confer with the officers of the American Dental Association looking to the holding of a union meeting next year respectfully recommend:

*First*, That the invitation of the American Dental Association to hold a meeting for social and scientific purposes be accepted.

*Second*, The two committees agree to recommend that Louisville, Ky., be the place and the fourth Tuesday in August the date for holding such union meeting.

*Third*, That all details of arrangements for the consummation of this object be placed in the hands of the officers of the association with power to act.

Adopted unanimously.

(To be continued.)



## NATIONAL ASSOCIATION OF DENTAL FACULTIES.

THE fourth annual meeting of the National Association of Dental Faculties was held at the Ebbitt House, Washington, D. C., commencing September 3, 1887.

President C. N. Peirce in the chair.

The following colleges were represented: Baltimore College of Dental Surgery, Prof. R. B. Winder; Ohio College of Dental Surgery, Profs. H. A. Smith, J. S. Cassidy; Pennsylvania College of Dental Surgery, Prof. C. N. Peirce; Philadelphia Dental College, Prof. S. H. Guilford; New York College of Dentistry, Prof. Frank Abbott; Boston Dental College, Profs. J. A. Follett, Wm. Barker; Missouri Dental College, Profs. H. H. Mudd, A. H. Fuller; Harvard University, Dental Department, Profs. Thos. Fillebrown, C. A. Brackett; University of Michigan, Dental Department, Prof. J. Taft; University of Pennsylvania, Dental Department, Prof. James Truman; Chicago College of Dental Surgery, Profs. Truman W. Brophy, A. W. Harlan; State University of Iowa, Dental Department, Profs. L. C. Ingersoll, A. O. Hunt, W. O. Kulp, I. P. Wilson; University of California, Dental Department, Prof. C. L. Goddard; Kansas City Dental College, Profs. A. H. Thompson, J. D. Patterson; Vanderbilt University, Dental Department, Profs. W. H. Morgan, D. R. Stubblefield; Minnesota Hospital College, Dental Department, Profs. W. A. Spaulding, T. E. Weeks, C. M. Bailey, M. G. Jenison, E. H. Angle.

The following schools were admitted to membership during the sessions: Northwestern College of Dental Surgery, represented by Prof. M. Stout, F. H. B. McDowell; Dental Department, University of Tennessee, Prof. J. Y. Crawford; Indiana Dental College, Prof. J. E. Cravens; Louisville College of Dentistry, Prof. D. S. Reynolds; Dental Department of Northwestern University, Evanston, Ill., Profs. J. S. Marshall, W. W. Allport, L. P. Haskell; Dental Department of Southern Medical College, Atlanta; School of Dentistry of Meharry Medical Department of Central Tennessee University.

Prof. Guilford, who was appointed at the last meeting to codify the rules, submitted a printed report, which was accepted.

The committee on text-books reported progress and asked for further time, which was granted.

A resolution was adopted excluding all persons not members of the association from being present during the meetings except by unanimous consent.

A communication from the secretary of the Royal College of Dental Surgeons of Ontario was referred to the executive committee, which subsequently reported.

Prof. Fillebrown offered the following, which was adopted :

*Resolved*, That applicants for membership in this association shall be regularly incorporated or chartered dental colleges or departments of medical colleges or universities, wherein at least one full course of lectures has been delivered, and they shall have been in existence one scholastic year.

The following rule was offered by Prof. Truman, from the executive committee :

Colleges connected with the National Association of Dental Faculties shall accept the certificates of associated institutions, subject to the rules governing each school.

Laid over for one year.

On motion of Dr. Brophy, the following was adopted :

*Resolved*, That it is the sense of this association that the conferring of honorary degrees be discouraged.

Reports were called for from the various colleges relative to the proposition made last year looking to the lengthening of the college year. The reports were in the main unfavorable to immediate action.

The query was made by Prof. Spaulding, What studies are graduates of medicine entitled to be excused from in the one year spent in a dental college? From the responses it appeared that no uniformity existed in recognizing chemistry, anatomy, physiology, and other studies as primary.

Prof. Truman offered the following, which was adopted :

*Whereas*, At the meeting of this association held at Niagara Falls, August 2, 3, 4, 1886, the following resolution was adopted :

*"Resolved*, That the dean of each school be required to furnish the executive committee with the exact character of the intermediate examination held in his school, and whether or not the examination is final;" now, therefore,

*Resolved*, That the deans of the colleges of the various schools under the jurisdiction of this body are requested to forward immediately the information as directed in the resolution as adopted.

A committee, consisting of Profs. A. O. Hunt, A. H. Fuller, and S. H. Guilford, was appointed to take into consideration the propriety of lengthening the terms of all schools not now holding nine-months sessions.

The executive committee reported adversely upon the application for membership of the Royal College of Surgeons of Ontario. The report was adopted.

The executive committee was instructed, on motion of Prof. Fillebrown, to report on applications for membership only when made at least sixty days prior to the annual meeting.

The following officers were elected for the ensuing year: A. O. Hunt, president; Thos. Fillebrown, vice-president; J. E. Cravens, secretary; A. W. Harlan, treasurer; Frank Abbott, J. Taft, S. H. Guilford, executive committee.

Adjourned to meet in Louisville, Ky., August 23, 1888.

## NEW YORK ODONTOLOGICAL SOCIETY.

THE New York Odontological Society held its regular monthly meeting, Tuesday evening, June 14, 1887, in the Hall of the New York Academy of Medicine, No. 12 West Thirty-first street.

The president, Dr. E. A. Bogue, in the chair.

## INCIDENTS OF OFFICE PRACTICE.

Dr. S. L. Benson presented a lower gold plate, to which were attached partial caps bearing upon the crowns of the remaining natural teeth so as to prevent the forces of mastication forcing the plate into the gum.

Dr. William Jarvie. The pressure comes upon the crowns of the natural teeth, and not upon the gums?

Dr. Benson. Yes. It enables a person to masticate without any pain, trouble, or inconvenience. I have been wearing such a plate, and I can speak strongly concerning its comfort. I have not seen such a device until recently. It may be new, and it may not.

The President. I have two bottles here that I should like to pass around for your inspection while Dr. Benson's case is being examined. One contains a tooth which was placed in the bottle nearly one month ago, the bottle at that time containing Herbst's obtunder. The question has arisen whether chemically-pure sulphuric acid, cocaine, and sulphuric ether could have any deleterious effect upon the teeth. I have waited for some gentleman to answer that question for some time; finally I put this tooth in the bottle, and there is what is left of it.

Dr. Chas. Miller. I suppose it is all there, but not in a solid condition.

The President. Here are two lower incisors which I extracted the other day, one of which was knocked out of the mouth forty years ago—the patient being then fourteen years of age—and re-planted. This tooth was about as firm as the other when I extracted it, for both were quite loose.

Dr. S. G. Perry. I would like to take a moment to report a case which has a bearing upon the implantation of teeth after Dr. Younger's method, or perhaps more strictly speaking John Hunter's method, of transplantation. A lady came into my office at dusk one evening, saying she had to take the train the next morning for San Francisco; she had broken off a lateral, and she came to ask me if I could do anything. I told her I thought I could, and I attempted to place an old-fashioned pivot-tooth with a metal pivot upon the apparently good root. In pushing the pivot to its place in the ordinary way the root disappeared, the tooth going with it. On pulling the tooth back the root came too. It was then easy to see



that an abscess had caused a large loss of bone about the root of the tooth. The query now came how to make this lady comfortable on such short notice. Some weeks before a little patient of mine had had a lower lateral extracted which she brought to me. I removed the pulp, filled the root with gutta-percha, dipped the tooth in the usual solution of bichloride of mercury, and laid it away in cotton to save it for possible use in transplantation or implantation. I outlined in a moment to the lady this system, saying Dr. Younger, of San Francisco, was authority in the matter, and she could see him in about a week, and if she cared to have it done I would insert the tooth. She consented. I pushed the new tooth to its place in the gum, and it seemed to fit perfectly. She seemed very much pleased, and I did not pull it out. I told her if it annoyed her on the way to California to pull it out and throw it away, but if it remained comfortable she had better go to Dr. Younger when she reached San Francisco and let him take off the thread with which I had tied it in place. She took the train next morning for San Francisco, and I heard no more about it until last week (Friday), when she came to my office after I had gone for the day and asked my office girl to look at her tooth. She said it had been entirely comfortable from the moment it was put in; that Dr. Younger had taken the thread off and congratulated her upon the success of the operation. I have not seen it myself, but my girl says she examined it very carefully, and that it was firm and had the appearance of perfect health.

The president hands me something here that to my mind is very important,—a clamp with a couple of hooks or ears so made as to catch and rest upon the grinding ends of the teeth to keep it off the



gum. There need not be any talk about it, because its utility is self-evident. It is Dr. Bogue's device. (See illustrations.)

Dr. J. Morgan Howe. I wish to call attention to the case that Dr. Benson has presented, for I think that it is the most important of recent contributions in mechanical dentistry. Over six months ago, when at Dr. Bogue's office, he showed me a case that he was just putting into the mouth, on which he used spurs or caps of gold in connection with clasps, to go over the grinding surface of teeth remaining in the mouth, so as to prevent the plate from pressing too hard on the gum. There was an upper and a lower partial gold

plate, and all the force that could be brought to bear upon the artificial teeth was not sufficient to make them impinge upon the gum so as to cause pain. I saw that the advantage of it was very great in many cases, and I have since used it a number of times with success. I learned from Dr. Bogue that he had used the method for a long time, and I desire to give him the credit justly due him.

Dr. Perry. I never saw a device of this sort before to-night, but it seems to me to be one of the most important improvements made for a long time, inasmuch as it is well suited for use in place of bridge-work. And this gives me a chance to go out of my way a little and refer to bridge-work. I never have put on a bridge yet, and I do not suppose that I ever shall, but I have taken off a great many of them. I have seen a great many elaborate pieces of bridge-work, but with the exception of cases where a tooth has been placed on a bar the two ends of which have been fixed in cavities in the adjoining teeth, or where a firm root has been made to carry two crowns, or in cases of the recent removable bridge, I have never seen a case that I would place in a patient's mouth. How anyone can do bridge-work after seeing this device I cannot imagine. It can be removed and kept clean without trouble, and will do all that bridge-work can do, and a great deal more.

The President. I do not know how the idea came to me, and I do not know that the credit should be given to me. But it is immaterial where it came from so long as we have it and can use it. I was exceedingly pleased to find that Dr. Benson, in a case that I had conjointly with him, was able to accomplish by the method here exhibited what he had never been able to accomplish for the patient before,—viz., utilize all the teeth in the mouth, above and below, protect the incisors from breakage, and fill all vacant places. Dr. Benson was successful in accomplishing a good result, and I proposed to him that he should come here and exhibit the case. The patient stepped in the other day to say how comfortable he had been with the appliance, and to express his acknowledgments for the care and skill with which the work had been done.

With regard to the clamp that is passing around, I will say that during my study over the principles underlying the separator, and after careful observations in a great many cases, I discovered that the teeth from the tops of the crowns to the necks were of a fairly uniform length; not the teeth of one person alone, but the bicuspid and molars of nearly all persons. Hence my own separator operates without injury or pain to the gums. Taking advantage of that fact, this little clamp was constructed upon the same principle. It has been used in my office for nearly two years, but so far as I know has not gone outside of the office. I take pleasure in presenting it before you.

I will say, also, for Dr. Atkinson's delight, I hope, that I have lately performed for the fourth time in my life the Hullihen operation successfully. The first time that I performed it was twenty-five years ago. I watched it until the day of the patient's death, and it was still successful. The last time I performed the operation was on the 6th of May. This afternoon the husband of the lady told me it was still successful. I had placed my metallic filling over the capping of the pulp; pain supervened shortly after, showing congestion of the pulp. Instead of resorting to part palliative treatment, I took a fine drill and drilled into the pulp beneath the gum. It was a lower molar. The pain was a little sharp for a quarter of a minute or so. I applied cocaine and sulphuric ether, and the lady went home comfortable and has since remained so. The reason for this treatment is the idea that there is congestion in the pulp, which is inclosed in a chamber that will not yield to the pressure of swelling; if blood can be drawn from the pulp and vent given, there is a chance of recovery; and the cases I have so treated have recovered. The tooth retains its life, and is to-day sharply sensitive to heat and cold. The hole is below the gum.

Dr. Atkinson. Have you made any examination to ascertain whether there has been any secondary dentine deposited in the hole?

The President. I have not.

Dr. Miller. Have you attempted to stop up the hole?

The President. No.

Dr. Miller. I have.

Dr. Jarvie. With reference to this appliance for preventing the plate pressing unduly upon the gums, I will say that in a recent number of the DENTAL COSMOS appeared an article from the pen of some London dentist describing exactly the same thing,—that is, a gold clasp arranged in such a manner over the crowns of bicuspid and molars as to prevent the plate from slipping up and injuring the gum.

Dr. J. Smith Dodge, Jr. Since that invention has gone so far as England, I would like to assure the gentle men that it is a good working device. My father, who has not done much at dentistry for a number of years, has been doing that ever since I can remember. It must be two years since Dr. Watson D. Woodward, who is here to-night, made for me a lower plate which is almost a fac-simile of this one that has been passed around, with caps over the third molars, the only teeth remaining back of the single bicuspid on each side, holding the plate so that it would not drive down into the gum. It was very successful, and mastication was well performed. I have not seen it for a year, but I saw it a year after it was inserted and it was working nicely at that time. My father has turned over these little ears on the side of the clasp, especially on bicuspid, as



long as I can remember. So that my contribution to the discussion is that it is not only a good thing, but has been abundantly proved to be a good thing, that wears well. I happen to think of a patient for whom my father made such a plate very many years ago, and I know he wears it still, for I have seen the plate within a year. It is a thing that stands the test of time.

Dr. Perry. We will have to give your father a little mild scolding for not letting us know about so good a thing.

The President. If there is nothing further to be offered under the head of Incidents of Office Practice, I will ask Dr. Brackett to favor us with what he has prepared upon the subject of Dr. Davenport's paper.

[The proceedings of the meeting from this point were published in our September issue.—Ed. DENTAL COSMOS.]

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### CALIFORNIA STATE DENTAL ASSOCIATION.

At the annual meeting of the California State Dental Association, held in San Francisco, July 19—22, 1887, the following officers were elected for the ensuing year: W. A. Griswold, president; W. De Crow, vice-president; W. A. Knowles, secretary; S. E. Knowles, treasurer; T. N. Iglehart, librarian.

The next meeting will be held in San Francisco, the third Tuesday in July, 1888.

W. Z. KING, *Corresponding Secretary*,  
1001 Valencia St., San Francisco.

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### FIFTH DISTRICT DENTAL SOCIETY, STATE OF NEW YORK.

THE nineteenth semi-annual meeting of the Fifth District Dental Society of the State of New York will be held at the Vanderbilt House, Syracuse, N. Y., on Tuesday and Wednesday, October 11 and 12, 1887.

Members of the profession from other societies are cordially invited to be present and take part in the discussions.

C. J. PETERS, *Recording Secretary*,  
Syracuse, N. Y.

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### CONNECTICUT VALLEY DENTAL SOCIETY.

THE Connecticut Valley Dental Society will hold its next annual meeting at Hotel Warwick, Springfield, Mass., Thursday and Friday, October 27 and 28, 1887.

A cordial invitation is extended to the profession.

GEO. A. MAXFIELD, *Secretary*, Holyoke, Mass.

### NEW ENGLAND DENTAL SOCIETY.

THE twenty-fifth annual meeting of the New England Dental Society will be held in Boston, Mass., October 5 to 7, 1887.

It is intended to make the meeting a celebration of our "silver wedding," and many eminent men in the profession have promised to attend.

A. M. DUDLEY, *Secretary*, Salem, Mass.

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### OHIO STATE DENTAL SOCIETY.

THE fourth annual meeting of the Ohio State Dental Society will be held in Springfield, on Wednesday, October 26, 1887, the sessions continuing for three days.

J. R. CALLAHAN, *Secretary*, Hillsboro, Ohio.

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### MASSACHUSETTS BOARD OF REGISTRATION.

THE Massachusetts Board of Registration in Dentistry, appointed under the new law passed in April last, will hold its first meeting for the examination of applicants to practice in that State, at Hotel Warwick, Springfield, Mass., October 26, 1887.

E. V. McLEOD, *Secretary*, New Bedford, Mass.

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## EDITORIAL.

### DENTAL AND ORAL SURGERY SECTION OF THE NINTH INTERNATIONAL MEDICAL CONGRESS.

OWING to the necessity of going to press before the conclusion of the sessions of the International Medical Congress, we are obliged to defer a report of the Section on Dental and Oral Surgery until next month, when we hope to give also some editorial comments upon the subject. Suffice it for the present to say that the Congress and the Section were pronounced successes.

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### THE SOUTHERN DENTAL ASSOCIATION.

ONE of the most largely attended and most successful dental gatherings which it has ever been our pleasure to attend was that which convened at Old Point, Va., August 30th. We commence a report of the session in this issue, which will be continued in succeeding numbers.

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### APOLOGY.

A PRESSURE of matter has compelled us to lay over several communications, Hints and Queries, etc. We ask the indulgence of our contributors.

## ODONTOLOGICAL SOCIETY OF MEXICO.

THERE has recently been organized in the city of Mexico the "Sociedad Odontologica Mexicana," with Dr. Brito as president, and a clinic committee consisting of Drs. Spyer, Perez, Howe, Brito, and Falero. The society has already a membership of more than twenty, and bids fair to make honorable contribution to the advancement of dental science towards if not within the Halls of the Montezumas.

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## GEORGIA DENTAL LAW—CORRECTION.

DR. L. D. CARPENTER, of Atlanta, writes us that our table giving an analysis of the State dental laws, and published in the August number of the DENTAL COSMOS, should be corrected as to the Georgia law, as an amendment passed in 1885 requires that applicants to practice in that State shall obtain a license from the State Board of Dental Examiners.

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## NORTH CAROLINA'S AMENDED DENTAL LAW.

BELOW will be found the text of the amended dental law of North Carolina, as passed by the Legislature. The new act went into effect March 3, 1887:

*The General Assembly of North Carolina do enact:*

SECTION 1. That section 3148 of the Code of North Carolina, being chapter xxxiv of vol. ii, be stricken out and the following inserted in lieu thereof:

Hereafter no person shall commence the practice of dentistry who has not obtained a certificate from a Board of Examiners duly authorized and appointed in accordance with section 3149, and that part of chapter xxxiv which relates to dentistry, which certificate shall be registered in the office of the clerk of the superior court of the county in which such person proposes to practice, for which the clerk shall receive a fee of fifty cents. Provided, this section shall not apply to persons holding a diploma from a chartered dental institute.

SEC. 2. Any failure, neglect, or refusal on the part of any person holding such certificate to register the same, as above directed, for a period of six months, shall work a forfeiture of the certificate, and no certificate, when once forfeited, shall be restored, except upon the payment to said Board of Examiners of the sum of twenty-five dollars as a penalty for such neglect, failure, or refusal.

SEC. 3. In order to provide means for carrying out and maintaining the provisions of this act, the said Board of Examiners may charge a fee of ten dollars for each person applying for a certificate, which in no case shall be returned; and the funds so derived shall be placed in the hands of the secretary, to be used in defraying the necessary expenses in conducting the meetings of said board, and under no circumstances shall any part of such expense come out of the treasury of the State.

SEC. 4. Within six months from the time this act takes effect, it shall be the



duty of every person who is at that time lawfully engaged in the practice of dentistry in this State to cause his or her name, residence, date of diploma, or license and date of commencing of the practice of dentistry, to be registered with the secretary of the State Board of Dental Examiners authorized and appointed as aforesaid, in a book kept for that purpose. The statement of every such person shall be verified on oath before a notary public or justice of the peace in such manner as may be prescribed by the said Board of Examiners, which shall provide upon application blanks for this purpose. It shall be the duty of the secretary of the board to furnish the clerk of the superior court of each county a certified list of the names of all persons in said county who have registered according to the provisions of the act; and it shall be the duty of such clerk to register such names in a book kept for that purpose upon the payment to him of a fee of fifty cents. Any person thus registered can practice in one or more counties upon filing in such county or counties a duly certified transcript of such registration. All persons now practicing who shall fail to register according to the provision of this act within the time prescribed, and who shall offer to practice dentistry, shall be deemed guilty of a misdemeanor, and upon conviction shall be fined not more than fifty dollars nor less than twenty-five dollars for each offense. Any person who shall knowingly and falsely claim or pretend to have or hold a certificate of proficiency granted by said Board of Examiners shall be guilty of a misdemeanor, and upon conviction shall be fined not more than fifty dollars nor less than twenty-five dollars for each offense. All fines and penalties so recovered shall be appropriated to the school fund of the county in which the same shall have been recovered.

SEC. 5. Nothing in this act shall be so construed as to prohibit anyone from extracting teeth.

SEC. 6. That section 3156 of said chapter xxxiv is not intended to apply to this act.

SEC. 7. This act shall take effect from and after its ratification.

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## BIBLIOGRAPHICAL.

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THE AMERICAN SYSTEM OF DENTISTRY. In Treatises by Various Authors. Edited by WILBUR F. LITCH, M.D., D.D.S., professor of prosthetic dentistry, etc., in the Pennsylvania College of Dental Surgery. Volume III.—Anæsthesia and Anæsthetics; Physiology of Digestion, Voice, and Speech; Associate Dental and Oral Pathology; Oral Surgery; Eruption of the Teeth; Materia Medica and Therapeutics; Metallurgy; Jurisprudence. With 301 illustrations. Royal octavo, pp. 1024 and index. For sale by subscription only. Complete in three volumes. Price, per volume, cloth, \$6.00; leather, \$7.00; half morocco, gilt top, \$8.00. Philadelphia: Lea Brothers & Co., 1887.

The third and concluding volume of this great work has been received, but too late for adequate notice in this number. We will give it due attention in our next issue.

## PAMPHLETS RECEIVED.

Alveolar Abscess: Growth, Development, and Treatment. By Geo. A. Maxfield, D.D.S., Holyoke, Mass. Reprinted from *The Independent Practitioner* for July, 1887, by request of the Vermont State Dental Society.

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## OBITUARY.

## J. H. DEVORE, M.D., D.D.S.

DIED, at Corry, Pa., August 3, 1887, Dr. JOHN H. DEVORE, in the fiftieth year of his age.

Dr. Devore had been in declining health for a year or more, from an affection of the stomach and bowels contracted while a prisoner of war during the Rebellion. He was born at Maple Creek, Fayette county, Pa., December 13, 1837. He was educated at Bethel Academy, in Washington county, and when the oil excitement occurred he went to the field of operations and was quite successful in his ventures. When the Rebellion broke out, in 1861, he enlisted in the Eighty-third regiment of Pennsylvania Volunteers. He served about three years, and was taken prisoner during the battles of the Wilderness and sent to Andersonville, and from thence to other prisons, and was released only when the war closed.

Dr. Devore studied dentistry with Dr. Greenlee, of Meadville, and subsequently became a student at the Philadelphia Dental College, at which he graduated in 1874. He also graduated in medicine at Worcester University, Cleveland, in 1878. He practiced dentistry at Cochranston for three years, and at Union, Pa., for ten years. He also practiced medicine at Union and in Warren county. He removed to Corry in August, 1883, where he carried on a highly successful and lucrative dental practice until his decease. He was a skillful practitioner, a man of extended knowledge in his profession, and possessed social qualities which rendered him popular and sincerely regretted at his death. He was a member of the Masonic order and several other fraternal organizations. He leaves a wife and daughter.

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## JOHN McCALLA, D.D.S.

DIED, at Millersville, Lancaster county, Pa., July 28, 1887, of heart disease, Dr. JOHN McCALLA, in the seventy-third year of his age.

Dr. McCalla was born in the province of Ulster, Ireland, November 21, 1814; came with his parents to Philadelphia in 1821. He was apprenticed to the tailoring business, and followed that trade in Philadelphia and Baltimore until 1846, when he commenced the study of dentistry with Dr. C. A. Harris, and graduated at the

Baltimore College of Dental Surgery in 1848. He practiced for a short time in Philadelphia; then removed to Lancaster, where he continued to practice until 1877, when he retired from active life and settled in Millersville.

Dr. McCalla was one of the petitioners for the charter of the Pennsylvania College of Dental Surgery, one of the organizers of the Odontographic Society of Pennsylvania, and one of the founders and the first president of the Harris Dental Association. He ranked among the pioneers of progressive dentistry, and was considered as skilled and expert in his profession.

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### ISRAEL WILLIAMS, D.D.S.

DIED, at Tuscarawas, Ohio, August 13, 1887, of nervous dyspepsia, Dr. ISRAEL WILLIAMS, in the fifty-fifth year of his age.

Dr. Williams was born in Fairfield Township, Ohio, October 11, 1832. At the age of twenty he entered Mount Union College; pursued the classical course for four years, and graduated in the scientific department in 1859. He studied dentistry with Dr. H. S. Stone, in New Philadelphia, and entered into partnership with him in 1861. He practiced his profession there until 1885.

Dr. Williams was a graduate of the Ohio College of Dental Surgery, a member and president of the Ohio State Dental Society, a member of the American Dental Association, and one of the State Examining Board. He was an enthusiast in his profession, a skillful operator, and enjoyed an extensive practice. He was a genial and affable gentleman, and had the confidence and esteem of a very large circle of acquaintances.

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### S. T. CLEMENTS, L.D.S.

DIED, at Faribault, Minn., August 31, 1887, of cancer of the liver and stomach, Dr. SYDNEY TIMOTHY CLEMENTS, in the fifty-seventh year of his age.

Dr. Clements was born at De Ramsy, Province of Quebec, Canada, April 25, 1831. He began the practice of dentistry in Ogdensburg, N. Y., in 1855, and the following year removed to Kingston, Canada, and in 1858 to Napanee. He went to Faribault, Minn., in 1881.

Dr. Clements was devoted to his profession, and was learned and skilled in all its departments. Recognizing this fact, the Canadian Government, about the year 1857, conferred upon him the degree of Licentiate in Dental Surgery, and in 1885 he was appointed by Governor Hubbard a member of the Minnesota State Board of Dental Examiners, and became its president, which position he held at the time of his decease.



THE

# DENTAL COSMOS.

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## ORIGINAL COMMUNICATIONS.

### COMBINATION MOVABLE BRIDGE-PLATE.

BY J. L. DAVENPORT, D.D.S., NEW YORK, N. Y.

THE patient was a gentleman about fifty-five years of age. The upper jaw contained the six front teeth, the three molars on the right side, and the first bicuspid on the left. The lower jaw contained all but the left central incisor, the second bicuspid, the three molars on the right side, and the first and third molars on the left.

In consequence of this lack of occluding back teeth, mastication had been performed solely by the front teeth, causing attrition so great on the upper ones as to entirely obliterate their crowns, while the lower ones suffered but little less, as will be seen by reference to Fig. 1.

The patient had managed for a long time to masticate, though imperfectly, upon these stumps, but latterly could eat scarcely anything but soups and soft foods.

The case so puzzled me that I submitted models of it to many members of both the New York Odontological and First District societies for their suggestions and advice. The counsel thus received, though exceedingly good, was so conflicting that I became more bewildered than ever. It was very plain to me, however, that the abraded surfaces of the lower teeth must be restored, and this was done by building them up with Watts's crystal gold, using no screws, but relying wholly upon grooves and retaining-points.

Some years ago I sustained a few failures with the so-called "Mack's screws," since which time I have avoided them. The coarse-threaded screws now furnished by The S. S. White Dental Manufacturing Co. are, I have no doubt, excellent if the teeth are large and strong, but in the crown-building of a lower incisor I prefer to do without them.

The restoration of the lower teeth being completed to the extent of about one-eighth of an inch on an average, to make them of uni-

form height, my attention was directed to the upper incisors and cuspids, nearly all of which I found with dead pulps, and some of them in a condition of active abscess.

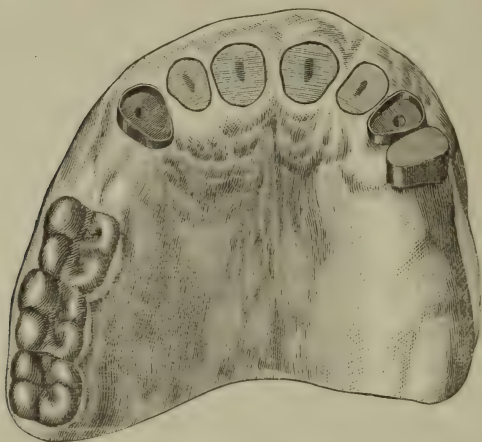
I might mention here that several members of the profession who are expert at crown-building advised me to restore the upper teeth

FIG. 1.



with gold also, but, as the loss of substance was very great, I could not believe it would be as well for my patient as some other method. I have seen several cases of permanent (?) bridge-work where hidden roots were abscessing, the faces swollen, the bridges loose, and

FIG. 2.



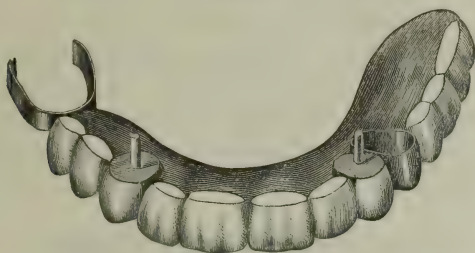
their owners begging for relief, but refusing to go back to the originators of their trouble.

I therefore resolved to give this gentleman a combination plate and movable bridge. The two superior cuspid roots were dressed down nearly to the gum and fitted with 22-carat gold cap-crowns,

similar to those described by Dr. J. Rollo Knapp. After these had been placed in position, a hole was drilled through each cap of a size suited to that of the pulp-canal, and a tube of iridium and platinum was adjusted in the root and cap and waxed in position. The cap and tube were then taken off and soldered, great care being taken to have the tubes enter both roots perfectly parallel. These were permanently secured in the roots with gutta-percha, and to prevent the caps being pulled off the top of each tube was slit down a trifle, and after insertion was bent back into the gutta-percha with a warm instrument.

The incisor roots having been dressed down even with the gum and filled, a plaster cast was taken and a narrow 20-carat gold plate was swaged to fit over the ends of the incisors and the capped cuspids, making it a little broader where it had to rest on the gum back of the first left bicuspid root. A hole in the plate was then made to expose the root of the first left bicuspid. This was fitted with a bifurcated iridio-platinum pin, having notched sides, and a ham-

FIG. 3.



mered head upon its lower end, which came down below the root about three-eighths of an inch.

A thin iridio-platinum band was then made to encircle the root, passing just under the gum and being slightly longer than the headed pin. This band was perforated with two rows of holes, from without inwards, giving the inner surface a roughness similar to that of a nutmeg-grater. The band and pin were then made secure to the root with a non-shrinkable copper amalgam.

Fig. 2 shows the upper jaw ready for the plate.

I must mention here that this method of lengthening the bicuspid is not original with me, but has been previously described by Dr. E. Parmly Brown. I have, however, used this method several times on very frail roots, and cemented over the entire a gold cap-crown.

In the present case, after the amalgam had become hard and the end and sides had been polished, a gold crown was fitted over all just up to the margin of the gum, and in close contact with the end of the band and amalgam. This crown was loose enough to admit



of its sliding on and off, though with just enough friction to hold it in place when at rest. This gold crown was then placed in position, the plate also inserted, and hard wax used to firmly join the two in the mouth. They were then removed and soldered.

Gold pins were then placed through holes drilled in the plate into the tubed cuspids; then soldered to the plate, the pins being of a

FIG. 4.



size to fit the tubes accurately. The plate was also provided with a wide clasp encircling the first molar on the right.

The plate was then provided with a gold bar about one-eighth of an inch wide, occluding perfectly with the lower teeth, and plain teeth soldered in place, hiding the bar, and just meeting the gum in front of the incisor roots. The plate rested squarely against the

FIG. 5.



capped cuspids, each of which showed a narrow band of gold when the plate was in position. As finally completed (see Fig. 3), this was the most perfectly-fitting piece I ever inserted, requiring great care in its removal, and yet by a little practice the gentleman was able to remove and replace it quite easily. It was also as firm as any permanent bridge could have been, though it had no support on the left side back of the first bicuspid.

The lower jaw was supplied with a double 20-carat gold plate, having a wide clasp on the first right bicuspid, which, after being built up, presented a cone-shaped top, about which the clasp fitted so as to rest firmly upon the end of the tooth, thus preventing injury to the gums during mastication.

The only other peculiarity was that the second left inferior molar, being abnormally short, though well-formed and standing straight upright, was fitted with a wide clasp, extending almost one-eighth of an inch about the tooth, and a piece of gold plate with gold cusps was soldered into this clasp, covering the molar crown, and occluding with the molar on the upper plate. (See Fig. 4). This not only prevented the plate from being bitten down unpleasantly on the gums during mastication, but enabled me to use a shorter molar upon the upper than I otherwise could have done, and allowed better the antero-posterior and lateral movements of the jaws.

Fig. 5 shows the case as completed.

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## REMOVAL OF THE FIRST MOLAR.

BY G. S. DEAN, SAN FRANCISCO, CAL.

THAT was a large subject which Dr. Davenport essayed to consider in a single paper. Even the small section of it to which the New York Odontological Society directs attention—the effects of removing the first molar—is itself extensive.

These effects, as is well known, vary with the structural tendencies of the patient, with the positions of the teeth which remain in the mouth, and with the age at which the operation is performed. To say that they are identical under all circumstances, would be to make an assertion which could not be sustained. Moreover, they are multitudinous in number—those which most concern the dentist segregating themselves into two primary classes, which require to be separately considered, namely: First, changes in the positions of the anterior teeth; second, changes in the positions of the posterior teeth. The former are mainly of interest in connection with orthodontia; the latter, in connection with mastication.

I do not propose to attempt a consideration of the entire subject—all the effects of removing the first molar; but shall limit myself to the second class of effects—changes in the positions of the remaining molars in general, and of the second molar in particular.

In some cases no very important change in the position of the posterior teeth follows the removal of the first molar. In other cases there results a movement of translation—the second molar advancing into the vacant space. In still other cases there is a movement of rotation—the second molar turning or tipping. The actual phe-

nomenon as usually observed is, of course, a compound of these three factors. There is partial retention of position, partial translation, partial rotation. But, as the human mind is constituted, it cannot deal with complex phenomena in their totality. It must analyze them—decompose them into their elements, and consider these elements separately as factors in the actual or compound result. This, therefore, will be my endeavor. I shall consider the three factors in their usually-observed phenomenon as three distinct phenomena.

The first or negative result I shall pass in silence. It is probably never observed when the operation is performed in early life. On the second and third results, also, I shall have but little to say; my purpose being to contribute my mite to the solution of the problem which Dr. Davenport has opportunely propounded, by presenting two cases, one illustrative of each of two important factors in the common result, namely, rotation and translation.

Let me still further limit my subject. The rotation which follows extraction is itself a compound phenomenon, and is capable of analysis into three parts or simple rotations: First, rotation round a vertical axis; second, rotation round an antero-posterior axis; third, rotation round a transverse axis. Of these three rotations, the first is relatively unimportant; the second and third are those which produce the most marked effects on the articulation, and to these therefore attention will here be mainly directed.

I am sorry that the resources of a limited practice do not enable me to furnish precisely that which perfect causal exposition (demonstration) demands,—namely, cases of extraction at the same age in persons of different physical types; and conversely, cases of extraction at different ages in persons of the same physical type—the two sides of the same mouth being the best field here. A demonstration, of course, must demonstrate; that is, it must be final—conclusive. It must leave no room for doubt. To this end, all the circumstances must be alike—except *one*; then the varying circumstance is clearly the cause of the difference in effect. Material for this perfect causal exposition I have not. But, though I lack the means of complete demonstration, I may do some service to the cause of truth by presenting, in isolation, the different effects, together with their antecedents. I may thus, as I have said, contribute my mite to a demonstration which shall be accomplished by some one who is abler and more favorably situated.

The first case which I present (Fig. 1, A and B) is one wherein, on the left side, B, the upper denture is complete, but the lower sixth-year molar has been lost, and the lower twelfth-year molar has tipped forward and inward, so as to present the corono-disto-buccal



angle to the upper teeth. The superior first molar has come down to meet the rotated inferior tooth; but, in spite of this, the articulating surface of the rotated member is very small.

On the right side of this mouth, A, the upper sixth-year molar is missing; the twelfth-year tooth has been translated, but has suffered no perceptible rotation except round its vertical axis. Below two

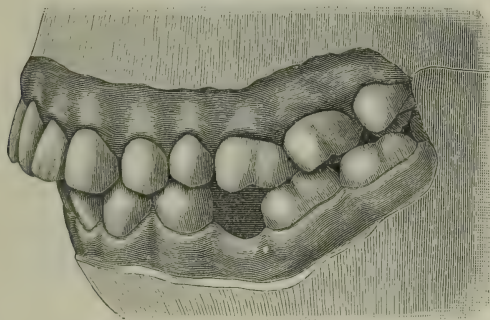
FIG. 1—A.



molars are absent; and the third molar is tipped or rotated, so that its grinding surface is minimal.

In the second case (Fig. 2, C and D), as in the first, the two sides of the mouth are substantially two cases. On the right, C, one would suspect absence of the *dentes sapientiæ* rather than of the first molars. There is no space between the bicuspid and molars—or

FIG. 1—B.

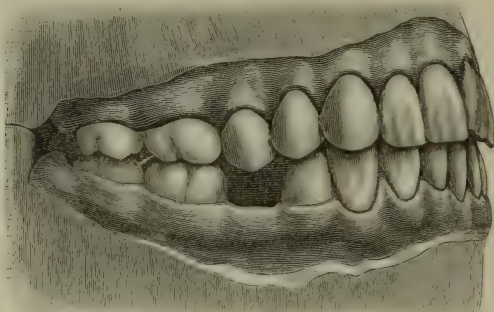


rather, there would be none if the crown of the second lower bicuspid were present (the root still remains). All the teeth are normally perpendicular, and the articulation is normally good—is equal to that presented by the ordinary complete denture.

On the left, D presents a somewhat different appearance; and this though the number of teeth is the same as on the right. The difference is due partly to the ravages of caries in the upper den-

ture, but mainly to the fact that there is in the lower denture a space between the molars and the bicuspid, and that the lower second molar has suffered some forward tipping—not accompanied, however, by any perceptible internal or lingual rotation. It results that the articulation on this side is not perfect; yet (ideal perfection, in articulation as in other matters, is rare in that class of

FIG. 2--C.



mouths with which the dentist has most concern) it is as good as that which we commonly see where all the teeth are present.

Briefly, the conditions found in the two mouths are these: Fig. 1 shows a maximum of rotation, with a minimum of translation; Fig. 2 shows a maximum of translation, with a minimum of rotation.

FIG. 2—D.



Fig. 2 shows, on the two sides, two phenomena: translation on the right; rotation on the left.

Taken together, the cases show a predominance of translation (and also of rotation round a vertical axis) in the upper jaw; of rotation, forward and inward, in the lower jaw.

I have nothing to say as to the goodness or the badness of the result in either case. I am simply stating what I find. Whether the reported condition is desirable or undesirable, it is not my prov-

ince, as a mere reporter, to discuss. But my report would be incomplete without some further facts. It is not enough to note the state of things which exists; there must also be given an account of the conditions precedent,—namely, the physical type, and the age at the time of the operations.

Both subjects are females; both are tall, about five feet seven inches in height, and both are young,—Fig. 1 being twenty-two years of age; Fig. 2, twenty-five. In physical type, though neither is robust, and neither specially delicate, there is an antithetical difference between them,—Fig. 1 being of a dark complexion, slender, and inclined to the nervo-muscular; Fig. 2 being of light complexion, heavy, and inclined to the adipose. If I accepted the orthodox doctrine of the four temperaments, I should class Fig. 1 as bilio-nervous; Fig. 2 as lymphatico-sanguine. If the two could be physico-chemically analyzed, we should probably find less density of tissue (that is, a larger proportion of water) in Fig. 2 than in Fig. 1; in other words, we should find Fig. 2 more “embryonic” than Fig. 1.

But though, not only in man, but throughout the animate creation, differences in physical type are attended by differences in plasticity and structural tendency, yet plasticity uniformly diminishes as one recedes from primitive life. In other words, the item likely to prove most important practically is the age at which the patient undergoes the operation.

In these cases I can give this information by hearsay only, as I was not the operator. But I believe that the statements of the parties can be relied on as substantially correct. In Fig. 1 the molars were removed when the patient was between fourteen and nineteen years old. In Fig. 2 extraction was performed when the patient was “very young;” except in the case of the left lower first molar, which was removed when she was sixteen years of age.

It will be observed that, with unlikeness in physical type, there appears a difference in the result. There is less tipping in Fig. 2 than in Fig. 1, although the operation was performed at nearly the same age. But in Fig. 2 itself, and again in Fig. 2 as compared with Fig. 1, we have the results of extraction at different ages—on which I shall make no comment.

My practice with regard to the removal of the sixth-year molar is irrelevant. I am giving facts, not rules. But if anyone desires to know my practice, he can easily infer it from the data here presented. And this practice, founded thus on positive data, will be continued until a change shall be demanded in the name of demonstrated truth. In other words, my practice is not capable of being in the least degree modified by Dr. Clowes's *opinion*, but is capable of being radically changed by Dr. Clowes's *demonstration*.



## IODOFORM AND ARSENIOUS ACID.

BY JAMES TRUMAN, D.D.S., PHILADELPHIA, PA.

THE many difficulties attending the devitalization of the pulp have, in times past, led many to adopt capping who would have preferred destruction and extirpation. It must be conceded that capping, in the large majority of cases, is a failure, and hence we are forced to fall back on old methods. The prominent objection, and one of great force, has been the pain attending the use of arsenic, and the impossibility of using it at all in hyperesthetic cases, as in pulpitis. It is well known that in all such presentations the resisting power of an irritated tissue prevents absorption of the devitalizing agent. This I discussed fully in my article in "The American System of Dentistry," and it is not necessary to elaborate here; but suffice it to say that all such tissues resist the action of the acid, and the resultant pain is severe and continuous, and without the effect desired. As far as I am aware, no application or combination of substances has successfully overcome this; the nearest approach being that by Dr. E. C. Kirk (DENTAL COSMOS, March, 1887), in his formula of cocaine hydrochlorat, acid. arsenios. pulv., menthol cryst., and glycerin; but he has "not invariably succeeded in making devitalization a painless process." At the same time I was interested in investigating the action of iodoform in this connection, and with such satisfactory results that I feel that in this agent, in combination with arsenious acid, the profession has a really *painless devitalizer under all conditions*. I have now tested it long enough, I think, to be satisfied that the conclusion reached is correctly based on collected facts. The number of cases now treated, covering all conditions of pulpitis, justify the opinion that the pulp can be devitalized while in a highly inflamed condition *without a particle of pain*. In no case has there been a variable result. In one instance the pulp resisted the action, but this, from well understood causes, is likely to be the case in a certain proportion of patients. So satisfactory has this been in my hands that I do not now hesitate to place it in any tooth, and I cannot help regarding it as one of the most valuable combinations that has ever been made for this purpose. At my suggestion, Dr. G. G. Milliken, assistant demonstrator of operative dentistry, University of Pennsylvania, has given this process careful testing, and with equally good results. It now remains for others to try it, and to confirm, if possible, the conclusions I have arrived at after some months of careful investigation.

The mode of using is very simple. The usual precautions are adopted of rubber-dam, drying the cavity, etc. Then I take the amount of arsenious acid I propose to employ, it being understood,

of course, that there is no change from the usual practice in this respect; place the arsenic on a glass slide kept for the purpose, and add an equal quantity of iodoform,—or an excess, it not being material; then a 5 per cent. solution of carbolic acid in sufficient quantity to make a paste; and the whole is carried to the pulp on a piece of cotton the size of a pin-head. This should then be covered with a cap made from platinum, or, which is equally as good, red gutta-percha; then cover in the usual way. Instead of having an hour of pain, as is usually the case, my observations and those of Dr. Milliken have been that the patients have not been conscious of any action whatever. If this result is confirmed by others, then I feel confident that we can return with some degree of comfort to the old modes of extirpation of the pulp and the filling of canals,—a practice perfected by Dr. Maynard, of Washington, and which I maintain has never yet been equalled by any mode of treatment whatever. If the time ever comes when we can keep the pulp alive and capable of performing its proper function, I for one will rejoice; but that time, in my judgment, is not yet at hand, and it seems to me that capping, as at present understood, is simply trifling with an important organ at the expense of our patients. Whatever may be the prevalent opinion on this point, one thing must be conceded,—that the saving of an irritated pulp is next to impossible; hence the value of this suggestion.

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## PROCEEDINGS OF DENTAL SOCIETIES.

### NINTH INTERNATIONAL MEDICAL CONGRESS—SECTION XVIII. DENTAL AND ORAL SURGERY.

THE ninth session of the International Medical Congress, which was held in Washington during the week of September 5, 1887, was one of the most successful in the history of the Congress. The whole number of members registered was about 2,750, indicating a larger attendance of visiting delegates than at any previous Congress, although the total membership at London in 1881, reckoning 1100 residents of the city who took part in the deliberations, was somewhat larger. The membership was cosmopolitan in character, representing nearly all the countries in the world where medicine is pursued as a scientific profession.

Dr. Nathan S. Davis, of Chicago, presided over the general sessions, which were held in Albaugh's Opera House. The Congress was formally opened by his Excellency, Grover Cleveland, President of the United States.

To facilitate its labors the Congress was divided into eighteen sections. The Section on Dental and Oral Surgery (Section XVIII), which was first organized at the London meeting, although interrupted at Copenhagen in 1884, was among the largest in numbers. Over four hundred dentists, about one-sixth of the entire membership of the Congress, attended its sessions. About forty of the dental delegates were from foreign countries. The scientific work of the Section speaks for itself. One notable feature was the prominent part taken by the younger men, showing that there need be no fear as to the immediate future of dental progress.

Two sessions were held each day, except the opening day, extending from 11 A. M. to 1 P. M., and from 3 to 6 P. M. The place of meeting was the Universalist church, corner Thirteenth and L streets. From 8.30 to 10.30 A. M., each day, clinical demonstrations were given in the Franklin school building. Many of the most distinguished operators in the various departments of dentistry aided in making the clinics of the most interesting character. In this building, also, the various exhibits of dentists' supplies were shown. Many of the leading manufacturers were represented.

#### FIRST DAY.

The Section was called to order by President Taft.

Dr. W. W. H. Thackston, Farmville, Va., as the oldest living graduate in dentistry, welcomed the foreign guests in a brief speech, and was followed by Dr. W. H. Morgan, Nashville, Tenn., who also bade them welcome.

Responses were made by Mr. W. Bowman McLeod, Edinburgh, Dr. J. von Metnitz, Vienna, Dr. John E. Grevers, Amsterdam, and Dr. Ernst Sjöberg, Stockholm.

Dr. Taft then read his address. In opening, Dr. Taft deemed it not amiss at this time to think for a moment of the factors and forces concerned in the development of dentistry as seen to-day. One hundred years ago there was not much of promise in the germ which has since developed so grandly. It attracted no considerable attention from the general public nor from those engaged in the general practice of medicine. The only thing that gave promise of any progress was a meagre and desultory literature, mostly in the shape of monographs. There was no marked progress until the time of John Hunter. His work, published in 1771, marked an epoch and attracted the attention and challenged the admiration of the medical world. From 1830 to 1850 the progress was much more marked than it had been. In 1829 Fitch published his "System of Dental Surgery." In 1826 Koecker had published his work, but it was more limited in its scope. Within ten years from the time of



the publication by Fitch many new works appeared, as many as twenty text-books upon dental subjects having been printed. During this period, also, the first dental journal was established,—the beginning of dental journalism in the world. In the years that have passed since its foundation not less than one hundred and fifteen periodicals have been started in the interests of dentistry, and have rendered service more or less efficient in the development of this important branch of the healing art. Upon the periodical literature of dentistry the other factors in the upbuilding of the science and art have depended largely for their effectiveness.

About 1840 the first effective associated effort was made, by the organization of the American Society of Dental Surgeons. Previous to that time there had been two attempts to secure coöperative work for the advancement of dentistry, but without marked success. After a career of sixteen years the American society was disbanded. What was accomplished by this society showed the advantages and pointed out the difficulties in the way of associated work. The advantages were so manifest that other societies were rapidly organized, and this has gone on until now nearly every State has its State society and many of the cities which have only a few thousand population have their dental societies. Besides those in this country there are many dental organizations in foreign lands. In Germany, France, and England especially efficient societies have been organized, and they included among their membership some of the most prominent practitioners in the world. Almost every civilized country had its dental association.

In 1840 the first dental college (the Baltimore College of Dental Surgery) was established. The proposition was a bold one, requiring a degree of courage not possessed by the average man. It was an untried field; the prospects for emoluments for the pioneers were not inviting, and failure would engulf all concerned in irremediable ruin. In the first class there were two graduates, Robert Arthur and R. Covington Mackall. Both of these had passed away, but there was present to-day the man (Dr. Thackston) whose degree in dentistry antedated that of any other living man, he having graduated in the second class of the Baltimore college. Five years after the foundation of the Baltimore college the Ohio College of Dental Surgery was established. Both of these pioneer institutions have pursued their work of preparing men for the practice of dentistry uninterruptedly to the present time, and they have been followed by others, until the number of colleges now in operation in this country was nearly thirty. Dental colleges have also been established in England, France, Germany, Russia, Switzerland, and Canada.

During the decade from 1860 to 1870 empiricism and false prac-

tice had so much increased that attention was directed to the enactment of laws to regulate the practice of dentistry and protect the public. The value of this procedure was unquestioned, and now thirty-six of the States were under the protection of dental laws. Other countries also had felt the benefit of legal enactments, and perhaps the most efficient of all the laws passed on the subject, as it certainly was the most comprehensive, was the law of Great Britain.

The four great forces in the development of dentistry having been considered, the question now was, had they been exhausted? Dr. Taft thought no one would doubt the suggestion that they have not been worked to their full extent, nor that they were now in better condition than ever before to upbuild the science and art of dentistry. The periodical literature never before detailed the progress of scientific and practical dentistry so well; it was practically a daily source of information. As for associations, there was nowhere marked progress where associated effort was not invoked. No one acquainted with the results of the educational system could say that the dental colleges were not capable of higher attainments than ever before. The laws were preventing the entrance of unqualified men upon practice. The demand of the hour at every point was for something better, and of this there was indisputable evidence here to-day. There were no real elements of discord and faction in the ranks of the dentists to-day. Instead the profession moved forward in solid column. While each member was capable of forming his own opinions, when the improvement of the general status was concerned, there was unanimity of action and thought. Having no factious struggles to exhaust the strength of the profession, the expectation was that this gathering would give a great impetus to dentistry. "Let us see to it that this expectation is realized to the full."

Among the miscellaneous business transacted was the presentation by Dr. H. L. Cruttenden, on behalf of the Minnesota State Dental Association, of a gavel for the use of the president of the Section, and its acceptance by President Taft. The gavel was unique in design, consisting of an enlarged fac-simile of a molar in vulcanite, suitably mounted. It was made, as Dr. Cruttenden said in offering it, of the three materials most used by dentists, gold, vulcanite, and cement.

An unanimous vote of thanks was tendered, on motion of Dr. R. Finley Hunt, Washington, D. C., to the Commissioners of the District, the Board of School Trustees, and the officers connected with the school building, for generously granting for the clinics of the Section the use of the Franklin school building with all its facilities.

Dr. R. J. Porre, Cincinnati, O., read a paper entitled "Chronic Pyemia of Dental Origin," which was a plea for careful examination

of the mouth in cases of pyemic disease where the cause was difficult of diagnosis. Referring to the details of a case which he had published some years since, in which the patient, who had been under treatment for thirty years, the last twenty for syphilis, was readily cured after the extraction of a concealed suppurating wisdom-tooth, Dr. Porre discussed the symptomatology of pyemia and the methods of dental disease in detail, pointing out the "curious resemblance between the diversified effects of the almost innumerable phenomena produced by the distribution of the morbid matter among different tissues under varying circumstances, and the cases offered for investigation." In the class of disorders produced by diseased and carious teeth the morbid results, as in other forms of vitiation, were proportioned to the magnitude of the cause, the idiosyncrasy of the patient, and the amount of vital resistance. Among the lesions from which grave pyemic disorders might be feared were scurvy, pyorrhea alveolaris, and alveolar abscess, which might involve the antrum. The process and effects of caries were both suggestive and interesting in this connection. The carious process once firmly established might extend, by means of the absorbents and lymphatics, which conveyed the infectious matters to other and distant organs and by a little stream, whether of decomposed pus or ptomaines, too small to destroy life outright by pyemia, but large enough to vitiate the health of the whole body, until although at first only a tooth-ache readily cured with a pair of forceps, it was able to produce a degree of physical suffering wholly incommensurate with its inconsiderable origin.

In support of his theory Dr. Porre detailed a number of cases, showing the protean character of disease consequent upon neglected dental disorders.

Case I. Excessive swelling of the left side of the face extending downward to the clavicle; the fourth attack within a year. The surgeon who sent the patient had opened the buccal wall into a cyst which discharged a teacupful of yellowish sanious fluid at intervals, gradually diminishing in quantity, until the symptoms subsided. A concealed root of the left first bicuspid was found, upon the removal of which a free opening with the engine revealed a sinus impacted with a cheesy deposit, which was broken up and the cavity washed with an antiseptic lotion, continuing the treatment daily for ten days, when a complete cure was effected. The lotion used was:

Carbolic acid	.	.	.	.	.	.	.	3j.
Eucalyptus oil	.	.	.	.	.	.	.	ʒj.
Chloride of zinc	.	.	.	.	.	.	.	3j.
Alcohol	.	.	.	.	.	.	.	3 viij.
Distilled water	.	.	.	.	.	.	.	Oj.



Case II. Patient suffered severe facial pains, involving the right eye, for relief of which he had sought the advice of an oculist, who, suspecting some obscure dental origin, referred him to Dr. Porre. The patient had previously suffered from loss of appetite, indigestion, and unaccountable mental depression and nervous prostration, for which sea air had been recommended without avail, and this was followed by a severe illness. An abscess was found, occupying the entire right half of the roof of the mouth, the cause of which was finally determined to be caries in the alveolus at the base of the right upper cuspid. The tooth itself presented no evidence of disease. A free opening was made, the sinus washed freely with the antiseptic lotion, and a drainage tube inserted, and in a short time the patient was turned over to his medical advisers.

Case III. General prostration, with traumatic lesion of the tongue. Patient's condition was of a low typhoid character. Under tonic treatment he would react for a time, and then relapse. The teeth were found covered with tartar and gums ulcerating; two teeth were ulcerated and discharging septic fluid; one of them, which inclined inward and had been worn to a sharp edge, continually cut into the tongue, thus actually distributing the virus by inoculation. The ulcerated teeth were extracted and antiseptic lotion applied, and the patient's medical attendant reported him in better health than for years.

Case IV. Patient had suffered for years from the entire list of protean tortures, and had been treated for nearly every sort of functional disorder. Painful furuncles of the scalp, after being opened, would secrete a purulent sanious fluid, which would burrow under nearly the entire scalp, requiring frequent tapping. Complete cure followed the extraction of ten teeth, others being treated and filled, and a large amount of tartar being removed from the remainder.

Case V. Patient had been treated for years for disease of the throat involving at times the pharynx, larynx, and fauces, causing serious local distress and general deterioration of the health. The throat disease disappeared and the patient's health rapidly improved under the simplest remedies, after extracting several ulcerating teeth, particularly a third molar root which was evidently the cause.

Case VI. Patient had a large cavity filled in the left lower second molar. The tooth became painful in a few days and so continued with brief intervals for two years, at times involving the whole side of the face. Last November the pain became intensified, and the swelling increased till the left eye was involved, followed by symptoms of paralysis which, in spite of the best medical attention, finally involved the entire side of the face, when the pain suddenly subsided. The patient experienced the usual functional derangements pathognomonic of pyemia. On account of the enfee-

bled condition of the patient when referred to the writer, the tooth was not extracted, but the filling was removed, when a liberal exudation, of no uncertain odor, followed. The tooth was thoroughly syringed with warm water, dressed with the following lotion, and the patient dismissed :

Chloral . . . . .	}	grs. xx.
Gum-camphor . . . . .		
Carbolic acid . . . . .		
Eucalyptus oil . . . . .		grs. x.
Salicylic acid . . . . .		grs. x.
Alcohol . . . . .		℥ ij.
Distilled water . . . . .		℥ ss.

The improvement in three days was astonishing and still continued, the promise being that the tooth would be saved, the paralysis dissipated, and complete restoration to health accomplished.

Case VII. Patient, aged 64, had enjoyed the best of health until within four or five years. His physician, recognizing aggravated symptoms of pyemia, examined the mouth for cause, as the result of which the patient was taken to Dr. Porre for the operation indicated. Seventeen teeth and roots were extracted, and in ten days afterward the patient had gained in weight six pounds.

Case VIII. Patient, aged 64, health formerly excellent, but deteriorating, with marked symptoms of pyemia. Three or four years previous had an abscess over the left superior cuspid, which opened spontaneously, and afterward continued to discharge a sanious secretion. Local medical treatment for a year failed. Examination showed the maxilla from the lateral incisor to the second bicuspids to be involved in caries. Cure followed extraction of the teeth involved and the cutting away of the dead bone, employing sulphuric acid to secure granulation. The antiseptic lotion was used daily, and the reconstruction of bone was complete in thirty days. The health of the patient was speedily restored.

Case IX. Patient, a lady aged 35, suffered from general debility, with serious complication of the uterus; had been under the care of a gynecologist for a year. Examination showed fifteen teeth and roots hopelessly decayed, and the gums and alveolus seriously involved in ulceration and caries, with excessive secretion and discharge of septic fluid. Complete recovery in two months followed the extraction of the teeth and treatment of the gums and alveolus.

In connection with the general subject of his paper Dr. Porre desired to direct the especial attention of the medical profession to the condition of children's teeth as an aid to diagnosis.

Dr. G. Frank Lydston, whose opening address was read by Secretary Dudley, believed that Dr. Porre had struck the key-note

to the explanation of many obscure ailments; that septic matter was quite generally found about the roots of the teeth, which might, under favoring circumstances, be absorbed into the blood, and there produce disturbances of greater or less degree. The mouth was a veritable hot-bed for bacterial culture, and presented all of the favoring circumstances for their growth, development, and differentiation. The special symptoms of furuncles and small dermic abscesses spoken of by Dr. Porre were not alluded to by most authors. In two cases under the writer's observation, he was enabled to make a correct diagnosis and prognosis by the existence of an extensive crop of boils and erythematous pustules. The varying results of septic absorption, as set forth by Dr. Porre, were too little appreciated. There could be no questions as to the relation of cause and effect in the cases recorded by him, in spite of the prolonged duration of some of them. (Dr. Lydston then recapitulated at some length the pathology of blood-poisoning.) The peculiar features of pyemia were only the ordinary sequences of suppuration intensified. In applying the theory to such cases as those described by Dr. Porre, it was sufficient to say that the same local and constitutional conditions which modified the severity of septemia also modified its duration; hence these cases were by no means surprising results of blood-poisoning. The slight extent of the local lesions, and the relative slowness of the process of absorption of the poison, explained their chronicity.

Adjourned.

#### SECOND DAY—*Morning Session.*

The Section convened at 11.15 A. M., President Taft in the chair. The discussion of Dr. Porre's paper was resumed.

Dr. George H. Chance, Portland, Oregon, showed a specimen of pyogenic membrane which he had removed. The trouble began in the left lateral incisor, and the patient, a business man of the Pacific Coast, had been treated in New York. When he reached home the roof of the mouth was all open, and the caries had nearly reached the palate bone. The patient had a fetid breath and a coated tongue, and was troubled with insomnia and debility. The tooth was removed and also the bone as far as it could be without cutting through the palate.

Dr. W. C. Barrett, Buffalo, would ask the gentleman what he called a pyogenic membrane.

Dr. Chance replied that it was a product of inflammation. It might be called a scab, if so desired; it was in fact a cast of the cavity from which it was taken.

Dr. Joseph Walker, London, England, had been surprised by Dr.



Porre's frequent recommendation of the forceps. His observation was that treatment of the teeth was a better way than extraction. It had given him great pleasure to hear the opening discussion by Dr. Lydston. Milnes and Underwood had spent three years in the investigation of the microbes and bacteria, and their conclusions were doubtless familiar to most of those present. It seemed to him that the cases reported by Dr. Porre were simply caused by microbes and bacteria, and if the cause had been removed by destroying them, a cure would have been effected.

Dr. A. E. Baldwin, Chicago, would ask Dr. Porre if he understood him correctly as recommending one drachm of carbolic acid in a mixture of a pint of water, and what was its effect.

Dr. Porre replied, Yes, with the addition of alcohol. It acted as a disinfectant. He varied his treatment; he washed out the sinuses and used disinfectants and antiseptics, varying in strength and character to suit the case. The formula given was of moderate strength and not likely to do any harm.

Dr. F. H. Rehwinkel, Chillicothe, Ohio, said that all dentists were familiar with the pathological conditions described by Dr. Porre, but just as Prof. Dawson had said to him, the "idea of chronic pyemia resulting from dental lesions, whoever had heard of it! If five years ago a dentist had said to the medical fraternity that it might and probably did occur, they would have called him a fool. We in Cincinnati have seen these cases and treated them until we have got tired, but here is a dentist who diagnoses them and treats and cures them in a remarkably short time." This paper opened a large field,—the way to find out whether there is a chronic pyemia dependent on dental or oral troubles.

Dr. C. A. Brackett, Newport, R. I., thought that if gentlemen would look carefully for caries and necrosed bone in the future they would find it much oftener than it had been observed in the past.

Dr. W. J. Younger, San Francisco, would simply suggest the use of two remedies. One was nitric acid, which had a strong affinity for lime-salts, in disintegrating necrosed bone. The other was corrosive sublimate in solution, 2 to 4 per 1000, as a disinfectant.

Dr. D. Genese, Baltimore, Md. In all the remedies that have been mentioned there was a possibility of harm from their escharotic and caustic character. As a remedy not open to any such objection he would suggest the solid extract of white poppy. A small pellet placed over the affected part would give very satisfactory results. Dissolved in water it made an excellent mouth-wash.

Dr. G. W. Whitefield, Evanston, Ill., would use electrolytic action. It would destroy the micro-organisms and would even destroy necrosed bone by decomposition. He used it also in the treatment of

pyorrhea alveolaris by passing an iridio-platinum needle into the pocket and placing the other pole outside the gum.

Dr. John C. Storey, Dallas, Texas, would ask Dr. Porre in what way did the pus enter the blood—by direct absorption or by entering the stomach, and thence reaching the blood by digestion?

Dr. Porre replied that he had left that point for the Section to decide. Unquestionably, in his opinion, it vitiated the blood by both methods. If the individual had a strong constitution he might be able to throw off the poison for may be a year, but eventually he would go down from indigestion and the train of troubles mentioned in the paper. Conclusions must be drawn in each case from the condition of the patient. He would like to ask Dr. Walker's objections to extraction in the cases he had mentioned.

Dr. Walker explained that he had expressed surprise at the frequent extractions because that was not the usual treatment of diseased teeth in London. The aim there was the preservation of the teeth rather than their extraction.

Dr. Porre replied that he had stated in the paper that the teeth extracted were all past salvation. They were too far gone, both the teeth and their surroundings, to make it worth while to attempt to save them. Some of the teeth affected were filled, as stated. Those only were extracted that could not be saved. He was opposed to the extraction of any tooth that could be saved.

Dr. Barrett thought the general tone of the discussion was hardly up to the highest standard of scientific and medical knowledge of to-day. He objected to the use of the term "pyogenic membrane;" he had supposed it was abandoned. He objected to the statement that pus was necessary to the production of the troubles mentioned. There was no such migration of pus-corpuscles as had been suggested in the paper. Each must be produced in its own center. That pus should be absorbed and carried to a certain definite part and there eliminated, he objected to. The pus must come from its own center. There might be transference of micro-organisms, but the pus itself could not be transferred.

The discussion was closed.

Secretary Dudley read a paper by Prof. E. Brasseur, Paris, France, "*De l'Air Thérapeutique Dentaire*" (The Use of Air in Dental Therapeutics), of which an abstract follows:

The writer wished to draw attention to the utility and advantages of heated air, the cases where it was of the greatest use, and to an apparatus for facilitating its application. Hot air was one of the best agents for, first, cleansing cavities; one vigorous blast would do the work quicker than the use of water, which besides was sometimes painful. Hot air was indispensable whenever the

rubber dam was used, for water could not produce the requisite dryness in caries of the second degree. Second, in obtunding the sensibility of dentine, in which the hyperesthesia was sometimes so violent that it was impossible to continue excavating. In such cases, after drying with alcohol and then using hot air, the dentine would be first less sensible and then altogether deprived of sensibility. He regarded the application of arsenious acid as a grave error, as he thought the tooth would lose its vitality and a dead pulp would be found in it, and possibly alveolar abscess. Happily that agent was not much used by those who desired to keep the organ able to perform its physiological functions. Tomes's theory of sensitive dentine was that it was owing to the presence of fibrillæ in the canaliculi. Other anatomists used the more general term, living-matter, which existed in the canaliculi and circulated through the tooth by osmosis. Hence sensation would be carried to the pulp across a layer more or less liquid. Though Tomes asserted that there was no example of sensibility being conveyed by liquids, the contrary was shown in the liquor of Cotunnus, which transmitted sensation to the auditory nerve, and also in the aqueous humor of the eye. The sensitiveness of a tooth varied according to the hygrometric conditions. If medicines would penetrate the canaliculi of the dentine in its ordinary state, the writer believed they would be more readily circulated by means of heated air. He rejected the use of crystallized carbolic acid or of any other caustic, because it produced, through the canaliculi, sooner or later, trouble in the pulp. Used carelessly it would destroy the living-matter in the canaliculi. In dead teeth carbolic acid melted at 42° C. might be used. It would penetrate all the canaliculi without harm. His advice would be to surround the cavity with the rubber dam, and use blasts of hot air. If not successful he would apply oil of cloves or a mixture of chloral and camphor. Two formulas which also seemed to give good results were:

1. { Eugenol, 10 grammes.  
  { Muriate of cocaine, 1 gramme.
2. { Veratria, 10 centigrammes.  
  { Absolute alcohol, 6 drops.

Dissolve; then add Tannin, 35 centigrammes; Glycerin, 8 grammes.

One drop applied on cotton would penetrate the canaliculi with heated air. He had seen disastrous effects from the use of carbolic acid in the first dentition. Abscess had formed, followed by necrosis of the alveolus. Many persons who would not use arsenious used carbolic acid, which arrived at the same result, though more slowly.



In the third stage of caries discolored dentine, partly softened, was met, which if taken away would expose the pulp. Many have regarded this layer of softened dentine as the best protection for the pulp. This pathogenic layer should be completely sterilized with hot air, followed by an application of bichloride of mercury, 1 to 1000; then hot air again, and followed by oil of cloves or eugenol; then hot air again, and cover with copal dissolved in ether; then at the bottom of the cavity a non-conductor, as gutta-percha or Hill's stopping, or asbestos wafers, should be applied, first soaked in oil of cloves or salicylic acid dissolved in eucalyptol or other antiseptic which was not caustic. In third-degree caries the disintegration has penetrated to the pulp-chamber, and the pulp may have various stages of disease. In the first stage there was mere exposure, the pulp alive. In this stage it was sensitive to cold. In the second stage, in which it was sensitive to both heat and cold, the pulp was still alive but commencing to secrete. In the third stage, sensitive to heat alone, the pulp was suppurating, followed by gangrene and mortification. The first stage demanded the most delicate attention, because it was the dentist's duty to save the pulp if possible. Patients would shrink only from pain, and want the nerve killed without regard to the cause of the pain. In such cases they should be told that a living pulp was necessary to preserve the vitality of the tooth; that if the pulp were killed nature in the course of time would make an effort to get rid of the tooth. In the first period the chamber must be kept free from moisture and septic influences. Pulp-capping was a very delicate operation, and demanded as much delicacy of manipulation as the oculist's operations. Compression was disastrous to an organ so sensitive as the dental pulp. If a current of heated air was directed into a cavity with a congested pulp protruding into it, the pulp might be seen returning to its usual chamber. For capping he used little platinum caps where they were applicable. He used also the medicine mentioned by Rosenthal and known as pulpine, which consisted of anhydrous oxide of zinc and oil of cloves made into a paste of the consistence of thick cream, applied gently to the pulp, which was previously dried with heated air. Over the pulpine a plastic filling material was placed to shield it from the liquids of the mouth. In the second stage of exposure he followed the same course, after having resected the secreting portion of the pulp, unless it was so highly inflamed as to cause violent toothache, in which case he proceeded at once to devitalize, which brought us to the third period. When the pulp was gangrened he adjusted the rubber dam, dried out with absolute alcohol, and applied a solution of the bichloride of mercury, 1 to 1000, or a bi-iodide, which was more powerful. The anti-

septic method was now more highly recommended than ever before. By drying with heated air the interminable dressings which so many still practiced were avoided, and he believed that as soon as the pulp was reached the most severe antiseptic method known to surgery should be followed. Heated air was excellent as an antiseptic in second-degree caries. If there should be alveolar abscess complication, and it was desired to put one or two drops of carbolic acid deep into the sinus, the use of an injector with compressed hot air would readily carry the medicament to the apex of the tooth or beyond. The pocket and passage once cleared, the hot-air blast could be used to dry out and also to blow into the pocket an antiseptic and astringent powder, as tannin and iodoform. When the inflammatory symptoms ceased there was nothing more to be done but to put in the permanent filling. •

Hot air was indispensable in all fillings, especially in the use of gutta-percha, gold, and Weston's cement. The air injector was also useful in determining whether the pulp of a tooth was living or dead, as by alternating hot and cold currents one could see to which the tooth was sensitive.

[Dr. Brasseur, after recounting the usual methods of inducing hot-air currents, described his own apparatus, an earlier form of which was shown in the DENTAL COSMOS some years since. The description would be unintelligible without illustrations, and is therefore omitted.]

Adjourned.

#### *Afternoon Session.*

The Section met at 3.15 P. M., President Taft in the chair.

Dr. C. A. Brackett, Newport, R. I., in opening the discussion on Dr. Brasseur's paper, said that the few criticisms he should make were liable from their mere mention to seem magnified out of their true proportion to his general appreciation and admiration of the paper. The title might have expressed the scope of the subject more fully, since it was plain that the force heat and the quality dryness were not less important in the author's estimation than the matter air, and that to their combination the happy effects obtained were due. The lessened sensitiveness of dentine brought about by anhydrous heated air was most probably explained by the theory, suggested by Dr. Jack, that to a greater or less degree the normally contained water of the tissue was eliminated, and the tissue was thus so much less capable of performing its normal, and in hyperesthesia its pathological, functions, among which functions was the conveyance of sensation. The water of the tooth, he apprehended, was largely contained in its living portion rather than in its lime; and it was the living portion which conveyed sensation. Eliminate a material per-

centage of its water, and we might compare it roughly to a jelly-fish removed from its native element and exposed to the sun. It was this principle which lay at the basis of efforts to obtund sensitiveness of dentine in the way advocated by the paper. There were other desiccating agents than the heated air; other means and methods of obtunding sensitive dentine which were generally well understood and practiced; some excellent formulas for the purpose being given in the paper.

The principal objection to be made to the paper, was to the portion where Dr. Brasseur said, "We reject the use of crystallized carbolic acid, or of any caustic agent, for it is not to be doubted that when it gets into the canaliculi it provokes, sooner or later, certain trouble on the part of the pulp." The speaker has not been in accord with those who taught that deliquesced carbolic acid and creasote were proper and advisable agents to use almost indiscriminately in the treatment of exposed pulps. It has long been his conviction that escharotic agents, such as these, should be kept from direct contact with delicate tissues like the pulp, if the vitality of the tissues was to be preserved with functions unimpaired. He would pit against each other the author of the paper, who would not allow the use of the deliquesced carbolic acid for the lessening of sensitiveness or for the disinfection and antisepsis of ordinary non-perforating cavities, and those who advised its direct application, by itself or in combination, to the fully-exposed pulp. The safer course was in the happy medium. The speaker had used deliquesced carbolic-acid, for fourteen years, to wipe cavities which were to be filled with materials not in themselves germicidal, and he believed the practice was right. If the essayist referred to the placing of carbolic acid crystals in the bottom of a cavity, in close proximity to a cavity, and leaving them there indefinitely, there was less occasion for criticism. It might be that in the translation the author's words were not given quite the meaning intended; from which circumstance misunderstandings might arise. The expression "dead teeth," for teeth merely pulpless, was an inaccuracy, either of the author or of the translator. The author's condemnation of arsenious acid was cordially indorsed. He was glad the author recognized pathological differences in exposed pulps, and varied his treatment accordingly, seeking to avoid destruction where possible. He differed somewhat with what the author said of pulp-capping, and he thought it possible that the best material for the purpose might be one of a slightly porous nature. The combination of oxide of zinc and oil of cloves was approved by many careful men in this country. Its capacity to absorb a slight exudation from the pulp might determine the life or death of the pulp. Gutta-percha was



objectionable, because especially of its imperviousness. The use of platinum or other metals in direct contact with the pulp seemed unwarrantable. Drying the canals of teeth affected with alveolar abscess was excellent, but few would attempt to apply the medicaments to the diseased surface in the form of powder blown through the canals. Perhaps with the proper appliances it would seem as practical as the author represented it. The question would then arise, would this method be as effective as freely washing the diseased territory with solutions. The profession could only be grateful to Dr. Brasseur, for what he has told of his experimentation, and for what he has described of his invention, as the best yet attained. Air, heat, and dryness, all valuable therapeutic agents, have had more and more attention paid to them, and it was reasonable to believe that in the future they would be accounted still more important, at least a portion of which increased valuation and appreciation might be fairly ascribed to Dr. Brasseur's paper.

Dr. James Truman thought there were probably many here who had not taken into consideration possible dangers in the use of hot air. We were apt to accept the statement of one of the eminent ability of the author of the paper, and many might make use of this process without due precautions. All knew that a tooth was not a dead body; that it contained prolongations of the pulp ramifying through the hard parts. These ramifications were as sensitive as the pulp itself. This being the case, if the heat were carried beyond a certain point, it would destroy these minute ramifications, and if this were done the same trouble would be set up that we were attempting to avoid, and in the course of time the pulp would die. He had observed these things in the past, and he had become very careful how he applied extreme heat to sensitive tissues. As to creasote, he did not believe in its extensive use as an application to the pulp. It would seem that when the last speaker used it in small cavities he would produce the same effect in the ramifications of the pulp before spoken of.

Dr. W. H. Morgan, Nashville, Tenn., subscribed to most of the ideas in the paper, but some of its statements appeared to be too broad. The proposition to dry the tooth with heated atmosphere would depend on the humidity of the atmosphere for success, and he supposed that the writer meant also dry atmosphere. The statement that dentists were justified in treating the pulp by the most energetic antiseptic method known, he wanted to emphasize, as he believed that the success of the operation depended on it, and he thought that if hot air were used to desiccate the contents of the cavity the best thing possible would be done. Another statement of the paper was that absolute dryness of the cavity was necessary

to fill with gold. Dr. Morgan apprehended that there were a good many dentists who, having been in practice before the rubber dam was introduced, knew that good preservative fillings had been put in that were in reality submarine operations. The paper also went into a description of the treatment of alveolar abscess, in which no exceptions were made. The speaker took it that the fundamental principle in medicine, that if the cause was removed a cure would be effected, was as true in the treatment of alveolar abscess as of any other lesion; and in this view he was sure that if the putrefaction was stopped the abscess would be cured.

Dr. Whitefield would call attention to two points only. It was well known that every time a sensitive spot was touched pain was produced. If the burs used in the treatment of dental lesions were properly prepared their first touch only would produce pain. If common salt (chloride of sodium) was placed in a pulpless tooth which had thus lost its color, and was then decomposed with the electrical current, the chlorine would be freed and the color of the tooth restored.

Dr. S. H. Guilford, Philadelphia, wished to bear testimony to the value of heated air in the treatment of the teeth. When the moisture in a cavity has been evaporated by any means a great deal of pain has been got rid of. The ordinary chip-syringe was of some aid for this purpose, but its work was slow and tedious. The first person to use compressed air in this connection was, he believed, Dr. Bing, of Paris. Several dentists in Philadelphia had put in an apparatus that accomplished the purpose reasonably well, and he hoped that great results would follow its use. It would give a current of cold air if the bulb was not heated; but if this was done it would give heated air. It required about five minutes to render an ordinary tooth nearly painless with hot air with this apparatus. In the second place, it was of inestimable value in setting dowel or pivot teeth, in which it was desirable to get the tooth dry, and cold air would do this perfectly. When the tooth was dried the dowel was inserted with good results. Frequently time was saved by using warm air. Some carried their employment of the apparatus he had described still further. Dr. Register proposed to utilize it to carry medicaments beyond the apex of the tooth. The speaker was very well pleased with it, and placed it next in value to his engine and appliances for condensing gold.

Dr. A. H. Brockway, Brooklyn, N. Y., said that his objection to all these appliances was that they were frightfully cumbersome and practically needless. He characterized them as needless because with a simple chip-syringe in the hands of an assistant a cavity could be got dry in a good deal less than five minutes. He might

be met by the objection that his way involved the aid of an assistant, and to that he would say that it was an easy way, and successful practice involved a good many things where an assistant was useful. He had used this method of desiccation a good many years, but had gradually been led to abandon it through fear that excessive dryness was dangerous. He overcame the trouble caused by sensitive dentine in this way: his burs were always sharp,—he never used a dull bur,—and in order to prevent clogging, which would produce friction and hence pain, he had his assistant keep them wet when in use with a little stream of tepid water. Nothing else that he had ever tried was so satisfactory to him.

The subject was passed.

Dr. J. E. Cravens, Indianapolis, Ind., read a paper entitled "The Management of Pulpless Teeth," in which he announced that the object of the paper was to present the merits of a system of managing pulpless teeth successfully and quickly without the application of medicines in or through the canals; that did not impair the structure of the dentine by saturation with foreign substances, and that recognized the necessity of normal pericementum. It was based on the proposition that a pulpless tooth was not necessarily dead. A pulpless tooth in which the function of the pericementum was suspended was practically dead, and any method of practice which so affected the pericementum was erroneous and pernicious. What should be said of a practice that forced irritant agents through a pulp-canal into the apical space with a full knowledge on the part of the practitioner that pericemental inflammation would ensue with tolerable certainty, and possibly alveolar abscess? If the objective point was a congested tract of pericementum it must necessarily be confined to the apical space, whereas inflammation was only occasionally confined to the apex. Diagnosis of blind abscess was largely guesswork, and when abscess did exist the accumulation of pus was so slight that it would cease when the apical end of the canal was closed, and without noticeable inflammation. The idea largely prevailed that pulp-canals must always be treated. The countless tubules that opened into it only rendered canal-medication more objectionable. The final history of a tooth, the structure of which had been saturated with medicine *via* the pulp-canal, was that the pericementum became permanently hypertrophied, the tooth became discolored, and was eventually cast off as a foreign body.

The method presented by this paper required that the apical end be closed as soon as the canal was laudable. A clear, clean canal was always laudable. If the apical end of a pulp-canal was properly and permanently closed, it mattered little with what the remainder of the canal was filled. In clearing out pulp-canals, simple manipu-



lation would accomplish all. Solid or semi-solid substances might be removed with slender steel broaches, slightly hooked or barbed; gaseous contents by displacement with a swab made by winding a few fibers of absorbent cotton, loosely, on a slightly-barbed broach, and small enough to pass easily to the apical constriction; fluid contents by absorption, by using the swab already mentioned. No pressure should be exerted. An easy and safe method of closing the apical end of a canal was to cut No. 10 tin foil into strips about an inch long, and narrow enough not to clog the canal, nor to compress the contained air while being passed to place; carry them singly and slowly to the end of the canal, and render as compact as possible by gentle manipulation with a smooth, springy canal-plugger. Malleting was unnecessary and should be avoided. If the case was complicated with extensive alveolar abscess, with a fistulous opening, he cleared the canal with the swabs already mentioned, until it became laudable, after which he filled the apex promptly and permanently. The fistula would accomplish the necessary drainage and the abscess would finally disappear, without pulp-canal medication.

In managing pulpless deciduous teeth, the method was much the same, except that the canals were to be filled entirely with phosphate of lime in the magma state, which might be thickened with dry phosphate, or have the water removed by dental absorbents until of proper consistence for manipulation. No attempt should be made to close the end, and as much of the phosphate should be worked in as may be done without force. No subsequent inflammation or fistula has occurred in deciduous teeth managed in this way, in an experience of five years. No medicine should be used in the pulp-canals of deciduous teeth, and force was absolutely inadmissible.

Many adult teeth, whose pulps were devitalized and removed, and the canals filled at once without medication, have afterwards manifested unmistakable sensibility to thermal changes, and there have been indications in some cases that the roots of deciduous teeth have continued to be resorbed after the canals were filled with phosphate of lime as described.

Dr. Thomas Fillebrown, Portland, Me., who opened the discussion, understood by a pulpless tooth one whose pulp had ceased to perform its functions. That cleanliness and dryness were the essential points in the treatment of pulp-canals, he believed was strictly true. That medicine in pulp-canals always resulted in injury was not plain to him, but that attempts to medicate the parts beyond the tooth through the canals was wrong he did believe, and he was pleased to notice that non-interference through the canal

was gaining ground. The advocates of immediate filling were increasing, but he had never found it safe to hermetically seal the apex while active inflammation of the pericementum existed. In chronic abscess discharging through the canal without fistula, he could not conceive it safe to immediately fill, and thus stop the discharge. The danger of pyemia was too imminent to need more than a warning against the dangers of such a practice. Another important point made was the necessity of an impervious, indestructible filling-material to hermetically seal the apical end. Any porous filling would inevitably make trouble. The danger of malleting was overestimated. Skillfully performed, it inflicted no harm and would often overcome clogging that would resist hand-pressure. If a tooth was very sore, open at once and allow the products of inflammation to pass off, thus absorbing the abscess. The apical space spoken of was to the speaker a myth. There was no space until the tissue was excavated by art or absorbed by diseased action. If a pulp was thoroughly removed before disorganization took place and the tubuli freed from coloring matter from the blood, discoloration would proceed very slowly. If hematin was taken into the tubuli, and septic matter from the disorganized pulp taken up, discoloration would occur in spite of medication or non-interference. Cotton and other porous substances saturated with irritant drugs would prove a source of irritation and likely cause the loss of the organ. The paper said, "No medicine should be used in the pulp-canals of children's teeth," and then proposed to permanently fill them with phosphate of lime, and claimed complete success for this treatment. If medicine was good for deciduous roots it followed that it might sometimes be good for others also. The method of filling deciduous teeth with a non-irritating substance was worthy of trial. A method which had been very uniformly successful with the speaker for twenty years was to cleanse as thoroughly as possible; if any tendency to inflammation existed, keep the canal patulous until it subsided; then fill tight with cotton dressing, that could be easily removed, using sedative antiseptics on the dressings. Stop the cavity, when proved to be healthy, with cotton saturated with gum-sandarac, and fill the canal with a solid filling, hermetically sealing the apical foramen; treating any complications around the apex through the alveolus.

Dr. W. C. Barrett, Buffalo, thought the paper a peculiar one. It seemed to him that when the lack of pathological knowledge shown in the paper was considered,—the ideas of years ago presented in a World's Congress,—it would be thought that they were taking steps backward. Within five years such advances had been made that it certainly was not up to the ideas of the times, and he wanted to

protest against its being accepted as a true interpretation of the intelligence of American dentists. The writer should come up to the knowledge of to-day. Whoever attempted to treat pulpless teeth without considering aseptic conditions was behind the times. The treatment, from its very commencement, must be managed from an aseptic point of view; drainage must be afforded,—egress to the septic matters which caused the condition under treatment. He was astounded at being warned against opening the pulp-canal, which was the first thing to do. The second was to entirely disinfect the contents, and the third to apply a germ-destroyer, which would not only cleanse the canal but destroy the germs which originated and sustained the condition. Those were the points in the treatment of the conditions spoken of by the paper, after which came the conservative operation, with which the paper, of course, had nothing to do.

Dr. A. W. Harlan, Chicago, remarked that the title of the paper said it was "a system for the treatment of pulpless teeth," and then was read a medieval romance. We were dealing with the modern advancements in antiseptic surgery and bacteriology. The author said he banished mephitic odors, and to do this he swabbed the canals, into which pus was flowing, and rendered the roots laudable in that manner; forgetting that the dentine surrounding the pulp-canal was permeated with gases, which would not be affected by the swabbing. He then proposed to fill the canal without using any germicide. Such a statement was too far behind the developments of to-day to go forth in this Ninth International Medical Congress as a statement of the practice of the American dentists of to-day without protest. To say, as this writer appeared to say, that they must go back forty years and discard all they had acquired of knowledge concerning antiseptics and disinfectants for a mechanical procedure was, to say the least, absurd. The essayist would seem to imply that the only necessity was the treatment of the pulp-canal. A dead pulp produced no irritation in the canal; the disease which it caused was beyond. If one could mechanically displace an odor, which the speaker denied, and should then fill the root-canal without any disinfection, disaster would inevitably follow unless there should be a fistulous outlet. The gentleman said there was no surety that the root-canal contained pus. What was the object of possessing a microscope if it was not to detect the presence of pus-corpuscles in the fluid taken from the pulp-chamber? This paper purported to present a system, and it assumed that the usual practice of to-day was to force escharotics beyond the apex of the tooth where there was no blind abscess. The system as a system was unworthy of consideration, and the speaker was astonished that an American dentist should present a system not based on a knowl-



edge of advancement in pathology and the microbic theory of disease.

Dr. Morgan thought that Dr. Harlan was mistaken as to the time when the present treatment was first promulgated. That grand old man [pointing to Dr. Edward Maynard] more than fifty years ago had written a paper involving every therapeutical principle of the most advanced treatment of to-day. The speaker used the mallet as a remedial agent. He could with it drive out a moderate chronic periodontal inflammation. In the paper it was said that the roots of devitalized deciduous teeth should not be filled with metal, because the roots would be absorbed and leave the metal; that is, that there would be a physiological action in a dead tooth,—a tooth in which the dentine was dead. The proper treatment of pulpless deciduous teeth was their extraction, without a single case that he would except.

Dr. Charles R. Butler, Cleveland, O., could hardly conceive how any posted, intelligent man could project a system of treating teeth before this body, unless he had some object in view besides showing his own practice. Certainly Dr. Cravens's paper had had the effect of drawing out some most intelligent expositions of the principles that should govern practice in such cases. There was much variety of notions in regard to treating canals, but the principle was the same in nearly all

Mr. W. E. Harding, Shrewsbury, England, had met with many things since coming to America which excited his admiration and wonder; but nothing that he had seen so much astonished him as the paper under discussion. In England dental practitioners were thoroughly imbued with the idea promulgated by Prof. Lister, who first taught the theory of the treatment of surgical diseases by the aid of germicides to destroy septic influences. To be told that putrefaction in the pulp-canals was to be got rid of mechanically was astonishing, and he was glad to learn from the remarks of the gentlemen who had preceded him that it was not the general opinion of American dentists that aseptic conditions could be cured without the use of germicides. Septic matter, if not gotten rid of, would be absorbed to cause trouble. In treating, care should be exercised not to force the medicament through the canal, or inflammation would be set up, if it did not already exist. When there were germs in the pulp-cavity, an exit must be found for them, and a germicide must be applied to destroy them, and after the last one was destroyed the canals might be filled successfully.

Mr. George Cunningham, Cambridge, England, had prepared some statistics bearing on the subject under discussion, but so far they had failed to arrive, though he hoped to receive them before the adjournment of the Congress. He had a record of five hundred

cases of roots filled by the immediate method and one hundred by the ordinary method. These statistics, he thought, would lead those present to look a little more favorably on the views of the essayist.

On motion, it was voted to pass the subject, with the proviso that Mr. Cunningham should be permitted to present his statistics should they arrive, and that Dr. Cravens should be permitted to reply to the strictures that had been made on his paper.

Dr. T. E. Weeks, Minneapolis, Minn., read a paper entitled "Matrices as Adjuncts in Filling Teeth," which was a description of the different forms of matrices that had been brought out for the use of dentists, fully illustrated by well-executed drawings, and a detailed statement of the advantages they conferred in cases where they were applicable.

Dr. S. H. Guilford, Philadelphia, purposed to speak only as to the value of the matrix. Dentists in making contour fillings used to be obliged to commence at the neck and work down gradually and be absolutely careful to fill the cavity, and more than fill it, and afterward dress off the excess, unless they possessed the skill of an M. H. Webb, and those others who could build out just where they wanted to. By the aid of the matrix the gold could be built out just to the original contour, thus saving the time of the dentist and the time and suffering of the patient. Matrices were now so devised as to be almost immovable when placed, and with their aid the original outline of the tooth was described with the least labor, and when they were removed only a little finishing was necessary. The disadvantages were very few. Some have said that where the teeth were in close contact it would be impossible to get a perfect edge. This could be overcome with care, and it thus became of little moment compared with the advantages secured. Another claim was that the matrices were liable to get out of place or become dislodged. If a matrix was used that was immovable, there would be but little excess—only what was needed for dressing down the margins. The stiff matrices were going into disuse, and those consisting of a thin band were more and more used, because they would yield slightly and thus permit the very slight excess of filling necessary. The speaker had the best results with these with the minimum amount of time.

Adjourned.

#### THIRD DAY—*Morning Session.*

The Section was called to order at 11.15 A.M., President Taft in the chair.

The discussion of the subject of Matrices was closed.

A paper entitled "La Phthisie Vaincue par des Médicaments

au Milieu du Palais" (Phthisis Cured by the Continuous Application of Medicine to the Palate), by Dr. Pradère de Moine, Paris, France, was read by Secretary Dudley, and after a brief discussion, was referred to the Section on the Practice of Medicine.

Dr. J. v. Metnitz, Vienna, Austria, read a paper describing a case of Osteo-Myelitis, which terminated fatally. The paper was illustrated with casts and photographs.

Dr. M. L. Rhein, New York, remarked that the author of the paper spoke in his description of the treatment of two classes of cases, those in which there was abscess, and those in which there was infiltration of the bone; also of the advisability of not interfering with cases of the latter character, and of the risks that might attend interference. He wished to differ with the writer on that point, as he thought that many of those cases where there was infiltration were just the cases where interference was indicated, and where the best results might be expected to follow operation. Of course, the post-mortem cases presented here were beyond the reach of any earthly skill, but he differed materially with the prognosis in cases where the infiltration was not so thoroughly developed.

Dr. G. J. Friedrichs, New Orleans, said that as far as he understood the paper, the treatment did not amount to anything, as the patient died. It was simply a description of the case. He (Dr. Friedrichs) had had no experience in the management of such cases, but it seemed to him that the only procedure that would give a chance of cure would have been the excision of the lower maxilla.

The discussion was closed.

Dr. M. G. Jenison, Minneapolis, Minn., read a paper on "Art in Dentistry," which was followed by a paper by Dr. John Allen, on "Form and Expression in the Face."

Adjourned.

#### *Afternoon Session.*

The afternoon session, which was devoted to microscopical and histological subjects, was held in the National Theatre, to afford opportunity for the exhibition of the micro-photographs with which the papers were illustrated.

Dr. R. R. Andrews, of Cambridge, Mass., read a paper on the "Origin of the Dental Fibril," in which he stated that he must give his own interpretation of his personal investigations, his conclusions differing from the views expressed by late writers. After stating the methods of preparing specimens for the microscope usually pursued, with his objections to them, the writer briefly detailed his own plan; which was, briefly, to take the tissues fresh from the jaws of embryos, place them in a quarter to half of one per cent. solution of chromic



acid, changing daily for three days; wash in distilled water, place in a solution of gum arabic for several hours, then in a solution of alcohol to take out the water. Then pour paraffin and lard melted together into a convenient mold. When the paraffin becomes clouded in cooling, place the tissue with its outer surface dried in it, and allow it to become cold. Then cut the sections, the tissue and the knife both being under fluid. The sections are left in the fluid till used. By this method he worked as near life as was possible with our present knowledge. The sections were then placed in distilled water to dissolve out the gum, and then mounted in Markoe's glycerin jelly, seldom staining tissues to be examined by higher powers. His investigations led him to the belief that two kinds of cells were called into action in the formation of dentine, of which the odontoblasts formed the matrix. Between the odontoblasts were found pear-shaped cells, which were the true fibril cells. In the early stages of calcification of the dentine it was not uncommon to see the fibrils dragging a portion of the soft protoplasmic mass of the odontoblasts into the structure of the forming dentine. The fibril cell, having a higher functional purpose than the odontoblast, was always pear-shaped, having a process or processes next toward the dentine and sometimes a smaller process running into the pulp-tissue. These cells were found in the layer with the odontoblasts, and never abrupt and square against the forming dentine, although sometimes having that appearance and frequently figured by investigators as odontoblasts. These cells were the origin of the dental fibril, and their function was the nourishment of the matrix.

Dr. Andrews's conclusion was that the function of the odontoblasts and the cementoblasts was simply the formation of the matrix or basis-substance of their respective tissues; and that the bone-corpuscle, the dentine-corpuscle or fibril cell, and the cement-corpuscle had the higher vital function of nourishing this matrix.

At the close of his reading Dr. Andrews showed on the screen a magnificent collection of micro-photographs illustrating the various points considered in his paper.

Dr. Frank Abbott, New York, could not coincide with the views advanced by Dr. Andrews. From the third to the fifth month of intra-uterine life a material change was observed in the papilla. Several of the medullary corpuscles coalesced into one, upon the periphery of the papilla adjacent to the enamel-organ, which at this period might be observed forming a cap upon the papilla. The coalesced medullary corpuscles were known as odontoblasts. The theory that the lime-salts were deposited directly into the odontoblasts as such had been proved by recent researches to be incorrect. Viewed with a power of 1,000 to 1,200 diameters, a delicate reticu-

lum of living-matter was seen uniting with the wall of each corpuscle and with each other, which persisted as the living portion of the dentine. The odontoblasts were reconverted into medullary bodies, and then received the calcareous basis-substance, and became dentine. While this calcification was going on another row of odontoblasts made its appearance, from the sides and ends of which prolongations of the living-matter might be seen running into the canaliculi of the dentine already formed or in process of formation; spindle or wedge-shaped odontoblasts giving off one, those with broad ends two, three, four, or even five prolongations. It would thus be seen that the lime-salts were deposited around the living-matter or dentinal fibril and its branches. If the views of the paper were correct, considerable territories would be left in the dentine without canaliculi; nor did they make any provision for furnishing these territories with living-matter.

Dr. M. H. Fletcher, Cincinnati, O., then read a paper, entitled "Protective Dentine, or Dentine of Repair." The writer proposed for the growth of dentine thrown out by the pulp, in order to protect itself from an external enemy, the name "protective dentine," as being better suited for the conditions attending its formation than "dentine of repair." Secondary dentine should include all varieties of new growths of dentine whether in or out of the pulp-chamber. Protective dentine was characterized, in common with other new growths of dentine, by few and somewhat irregular dentinal tubes, and a larger per cent. of globular masses or calciferous material than normal, and a translucent zone was found between the irritated surface of the tooth and the pulp, called by Magitot the zone of resistance. The chief cause of the formation of protective dentine appeared to be the disturbance of the pulp, through the dentinal fibrils, the irritant being at the peripheral ends, as caries, fillings, abrasions, clasps, etc. Stimulating the growth of protective dentine seemed to be, from the observation of final results, pernicious practice, as secondary dentine was induced sufficient to cause the loss of the tooth. If it were possible to arrest the new growth at will, stimulation would be excellent practice. But the final result seemed to be evil rather than good, though in many cases (of abrasion especially) a growth of protective dentine would extend the period of usefulness of the teeth to a marked degree.

In the pathology of this growth some lesion on the surface of the tooth would be found,—anything which persistently irritated the distal ends of the dentinal fibrils,—and at an early stage the zone of resistance might be seen forming, and within the chamber a deposit of protective dentine. This was built much more rapidly than normal tissue, and was inferior in quality. The tubes were not so

regular nor so numerous and were not parallel to each other. Diagnosis of this growth was usually easy in abrasion, as it was distinctly seen as a bright yellow or clear spot, or in circles of brown when the wearing away encroached upon the pulp-chamber. In caries diagnosis was much more difficult, as there was usually no pain so long as the pulp retained its full vitality, nor could the deposit be seen as in abrasion. If the decay was dark and hard and almost stationary in its progress, and the patient was forty or over, new growths were most likely to be present. The writer had found protective dentine in a majority of deciduous teeth retained after their normal period and much decayed or abraded. If we could tell what would be the result of these growths we could decide what to do to prevent evil. Musket-balls shot into the pulp-chamber of elephants' tusks have become perfectly encapsuled with ivory [specimens shown]. This would give an idea of what the pulp would attempt to do when called on in this way. But this process of repair once established in the human tooth, appeared to result in many cases in the death of the pulp. The writer had never seen a case of complete dentinification of the pulp, and was convinced that it could not exist, as the pulp must have room for its necessarily constituent parts in order to form any of its products. The utmost limit to which the pulp could be contracted and still live was large enough for a reservoir for putrid matter sufficient to cause alveolar abscess. It seemed safe to conclude that evil would result in many cases if means were not taken to stop these growths in their incipency. The treatment would be to remove the exciting cause. If caries, plug in such a way that the filling would be non-irritating; if abrasion or erosion, stop its progress with gold capping; if exposed pulp, sterilize the softened dentine and carefully adjust a non-irritating cap to both pulp and dentine before filling.

Dr. W. Xavier Sudduth, Philadelphia, had been much pleased by the exhibits of photo-micrographs, and especially with the last, because it appealed to the profession at large, most of whom had the materials for constructing specimens like those Dr. Fletcher had shown. The dentine, as all knew, was developed by the odontoblasts. They remained quiescent upon the surface of the pulp after the dentine was developed, but they could be again stimulated into activity. Their office was to produce dentine, either physiological, as in the case of the first or normal dentine of the tooth, or pathological, such as was found in *secondary dentine*, or *dentine of repair*. The most common causes of the production of secondary dentine were thermal changes, conveyed to the pulp by large metal fillings, or irritation produced by abrasion. Whatever interfered with the normal condition of the tooth would give as a result secondary den-



tine. If there was any point in the microscopical pathology of the teeth more unsettled than another in the minds of observers, it was the "zone of resistance." It had been made the subject of much investigation, and no satisfactory conclusion had been reached. Dr. Miller had gone through a laborious line of experiments on the layer of dentine lying between the forming cavity and the pulp, and had found that there was no diminution, neither any increase, in the quantity of lime-salts in this much-discussed zone. Dr. Black claimed that he could clear it up with ether and more or less reproduce the normal color. There was evidently something in those tubuli which could be dissolved out by the action of ether. Black held that it was fatty material produced from the decayed dentinal fibers. Whether this was the true solution or not, the speaker did not know. In his own experiments, by soaking the specimens in essential oils, he could trace the permeation of the oils into the tubes. He had showed this work to Dr. Miller, who also considered the observation correct. If this was true, one thing was settled by it,—the tubes were not filled up with lime-salts; were not calcified. What had been said by the essayist regarding the capability of the pulp to deposit dentine might be objected to on fine technical grounds. The pulp did not deposit dentine. The formation of dentine was the work of the odontoblastic layer, which, while it might be said to be a part of the pulp, was not the pulp, but a specially endowed functionizing layer, and did not depend upon the pulp for its action other than the supply of the salts of calcium conveyed to it by the vessels of the pulp. As long as the foramen was open and the vascular supply kept up, it might go on and entirely fill up the chamber, except that portion occupied by itself. This was shown very nicely in the tusks of ivory, where only a trace was left to mark what had once been the pulp-canal. The speaker was much pleased to see the specimens of pathological ivory. It showed that others were becoming interested in the subject, and he was satisfied that something would come out of the research. He understood that Prof. Busch, of Berlin, had a paper to be read before the Section, on pathological ivory, and furthermore that he coincided with the speaker's views of inflammation in dentine and enamel. It was to Dr. Busch's collection that he had referred in his paper read before the First District Dental Society on February 1, 1887, and published in the *DENTAL COSMOS* for May of the same year. What Dr. Fletcher had said to-day when exhibiting his beautiful preparations fully coincided with the views then expressed; and so far as he (Dr. Sudduth) was acquainted with the literature of the subject, the writers of the article on Eburnitis, published in the *Independent Practitioner*, and to which his article above referred to was an an-

swer, stood alone and uncorroborated in their views of inflammation in non-vascular tissues. He had given the subject a great deal of attention, and he did not find in the whole domain of pathology the least analogy to the process they described. Dentine was a strictly non-vascular tissue, and derived its nourishment by osmosis. Other examples of non-vascular tissues were found in the cornua and in articular cartilage. It was well known that inflammation in these two tissues occurred by the formation of capillary vessels, which in the cornua occupied the lymph spaces. These spaces became dilated, and a vascular connection was made with the circulatory system at large. Then, and not till then, did true inflammation set in. Now, the dentine being a calcified structure, dilatation of the tubuli was not possible; consequently the formation of a circulatory system previous to decalcification was an utter impossibility, and, as he had so many times set forth before the dental profession, and which had not been controverted, decalcification was the work of osteoclasts, which were considerably larger in diameter than the dentinal tubuli; hence decalcification in the center of formed dentine was not possible. He had hoped that the authors of the article above referred to would have been here, and that there would have been an opportunity to further discuss the question. So far they had not made the least attempt in a scientific manner to answer the arraignment of their theories by Drs. Black, Allen, and the speaker, but had contented themselves with telling "nigger baby" stories and casting slurring remarks at those who had the temerity to oppose their views. Sarcasm was a Damascus blade that cut both ways, and it was barely possible that those who had taken it up might yet be mortally wounded.

Mr. J. Howard Mummery, London, England, exhibited a fine collection of photo-micrographs, showing the development of the tooth. They were in the form of photographic prints, and were much admired and appreciated.

President Taft remarked that he considered the histological exhibits to-day as one of the richest feasts that had ever been spread before a scientific body, and if the dentists did not grow in knowledge from this day it would not be the fault of what had been shown them.

Dr. Atkinson was fully in accord with the sentiment of the president, but he thought that if the dentists were to utilize the work which had preceded the presentments here to-day they must go deeper than the presentments themselves. The thing to be regretted respecting histological research was the lack of liberality of sentiment of one worker to another. It took a vast amount of research to entitle anyone to an opinion respecting generalizations, but gen-

eralizations must be had. He wanted to call attention to one thing, and that was that if one did not understand how the tissues were built up he would be a very poor judge of how they were taken down. He must first see how bodies were built. The common hen's egg afforded the best opportunity for the study of this subject. An egg examined when it had been sat on by the hen for six hours would show the minute first formings of the blood-islands, and the differentiation of the tissues from this point up to the formation of the perfect tissue could be readily followed. The blood tracts were without any walls, just as in the first steps in the differentiation of the human tooth. Those who studied these things should tell just what they saw without attempting to pronounce finalities. All observers did not reach the same conclusion because they did not compare things that were equal. Whatever it was that nourished growing tissues had not yet been learned. Melting of the lime-salts was what produced the zone of resistance, but when it came to the pronouncement of the cause, observers should go slow.

Dr. Sudduth had a few words to say regarding Dr. Andrews's paper. Protoplasm left alone had a tendency to assume the spheroidal form. The form of cells in tissue was largely due to the lateral pressure of fellow cells,—variation in form in the same class of cells was due to this influence,—as seen in the case in hand; the embryonic cells were compressed, and hence the variation in shape. In this instance form had nothing to do with function. The ameloblasts were also a good example. By compression they became hexagonal instead of spheroidal. Dr. Andrews laid stress on the form of the cell as determining its function, with which idea he disagreed. He wished to bear his tribute to the illustrations which Dr. Andrews had presented. They were, without qualification, the finest line of photo-micrographs he had ever seen. The fibrils of the odontoblasts were shown most elegantly; that was his idea of demonstrating tissues; and, as he had just remarked to Dr. Abbott, if Dr. Heitzmann could demonstrate his reticulum why did he not allow Dr. Andrews to photograph some of his slides instead of drawing them? No one doubted his ability as a draughtsman, but many doubted his capability to interpret what he saw under the microscope? By photographing he could do away with the personal equation and vindicate his position. If all observers could look through the same tube at the same specimens with eyes of equal quality, the probabilities were that this variation would not exist. The camera did this and gave the results shown. As to the interpretation of the specimens shown by Dr. Andrews: Everyone who saw them to-day had as much right to draw his conclusions from them as had Dr. Andrews. They had seen them as well as he, and had really



seen them better than he did in his laboratory, for the photo-micrographs showed many fine lines not seen under the microscope. The speaker thought it a mistake to make a differential diagnosis as to function on account of differences in shape, as it did not make any material difference what the shape was, the function remained the same. The nearer the specimens to the living tissue the better the work of the microscopist. He believed he had gone one step further than Dr. Andrews in studying the odontoblasts. Osmic acid, one-half per cent. solution, preserved the cells the best of any reagent used by the speaker. If a freshly-extracted tooth was put in equal parts of a one per cent. solution of osmic acid and alcohol a half hour, then placed in alcohol for twenty-four hours, and then broken and the pulp extracted, it would be found that the odontoblasts had not altered greatly in form or size. Some of them would be found spindle-shaped, some square, while still others would be dumb-bell-shaped, and all with fibrils projecting from the side next to the dentine. By this method of preparation it could be seen that the fibrils varied in number from one to as many as five or six, and that they extended from the body of the cell itself. Some of Dr. Andrews's specimens showed this very prettily, and one of them showed the form which had been pictured by Tomes, in which there were the double layers of the odontoblasts and the fibrils lying side by side and projecting into the dentine. The variation in the size and form of the odontoblasts in the developing tooth and the mature tooth was due to the fact that the odontoblasts in the developing tooth were functionizing while those in the mature tooth were quiescent; the odontoblasts decreased in size when their function was completed.

Mr. Walter Campbell, Glasgow, Scotland, announced that he would be prepared to show "the Hastie" water-motor for dental engines at the Arlington Hotel.

Adjourned.

(To be Continued.)

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### AMERICAN DENTAL ASSOCIATION.

#### SECOND DAY—*Morning Session* (Continued).

(Continued from page 646.)

DR. GEO. W. KEELY, Oxford, Ohio, wished to give a word of warning against the premature extraction of the temporary molars,—before the first permanent molars were erupted and in contact. He claimed that in every case where this was done it would cause a crowded condition of the anterior permanent teeth. To illustrate, he showed a model of the teeth of a girl who was brought to him

at six years of age with both of the inferior temporary molars abscessed. The abscesses were probed, giving relief, and the mother was told that the trouble was liable to recur, and the evils of premature extraction were explained to her. Soon afterwards the family dentist extracted the teeth. At eleven years of age the child was again brought to him with the teeth as shown by the model. As could be seen, the first permanent molars had come forward and the anterior teeth dropped back so that the molars and first bicuspid were in contact, the cuspid striking on the anterior portion of the first superior bicuspid, while the second bicuspid were struggling to erupt wholly outside of the arch. The distance between the centrals, measuring on a line back, was three-eighths of an inch. In the superior jaw the temporary molars were still in place, and the second molars just appearing. On removing the temporary molars the crowns of the second bicuspid could be seen. Six months later the second superior bicuspid and molars were in place, and a perceptible space had been made between the inferior molars and first bicuspid in the effort of the second bicuspid to erupt. More space was made by wedging, and when this was no longer useful a vulcanite plate was fitted to the superior arch bearing hard on the bicuspid to expand them, and the occlusion expanded the inferior ones, forcing them forwards, until now the occlusion was nearly normal.

Dr. W. C. Barrett, Buffalo, had a patient, less than seven years old, with the permanent centrals just erupting through the gum, one of which was knocked out. The child was brought to him forty-four hours after the accident. The tooth was incomplete, its root being a mere shell, and the foramen completely open. To a piece of thin platinum plate he soldered, at right angles, a platinum wire as long as the pulp-canal, filled the canal with oxyphosphate, thrust up the wire, and burnished the plate over the end of the root. An impression in wax was taken, and a cast made, in which a hole was drilled at the point where the central was lost, into which a tooth nearly corresponding to the missing tooth was cemented with plaster, allowing it to protrude about as far as the lost tooth would at full development. A narrow strip of very thin platinum, about No. 40, standard gauge, was burnished upon the cast of all the teeth, being carefully fitted to the inserted tooth. The platinum was then strengthened with gold solder, and the erupting tooth inserted in place in the alveolus; all the teeth were wiped off, and the stiffened platinum plate, filled with oxyphosphate of zinc, was carried to place and held until the oxyphosphate began to set. The child continued to eat upon it, and it was left in place three weeks. He did not encourage the parents to hope for the per-

manent retention of the tooth, but he did expect to retain it until the jaw was developed, and thus avoid a malformation.

Another case was of a young girl in her fifteenth year, with a condition of the teeth that might illustrate the evils of premature extraction. The six anterior teeth projected, giving the appearance of thumb-sucking, and there was a peculiar elongation of the bicuspid. The first permanent molars had been extracted prematurely. The aperture of the mouth could not be closed without thrusting out the tongue. There were two bicuspid and a molar on each side, and the problem was to draw in the anterior teeth without moving the posterior. Bands were fitted accurately around the latter and forced on with the greatest care. An impression was then taken, a piece of gold plate laid upon the three bands on each side, and each was soldered fast to it. His first idea was to slip a piece of rubber under the band which passed across the face of the anterior teeth, and move one at a time; but it was unnecessary, as they drew back without trouble, and the case was completed within three months, though it might have been done in one had he been less anxious. The point of this description was that, by fastening the fixed teeth as shown, it was possible to obtain a firm anchorage, so that three teeth could be moved by two in some cases, and that it would be impossible for them to tip or move one at a time.

Dr. W. N. Morrison, St. Louis, had a case of implantation of a left superior first bicuspid, in the early part of the year, which was so far successful. The patient had been under his care as a child, and in correcting an irregularity great difficulty was experienced in expanding the arch. The tooth which was replaced had broken down while the patient was in the mining regions, the greater part of the root had decayed, and the space had to be enlarged by wedging. The tooth used was an old, dry one, which was inserted into a socket bored in the alveolus.

Dr. A. N. Priest, Utica, N. Y., had listened with satisfaction to the descriptions of the various methods of moving teeth. Thirty-five or forty years ago dentists were quite at sea in these cases, but now the work was not so formidable. He had a case a year ago of pointed upper jaw, in which he commenced the treatment by bending a piece of piano-wire around the jaw so as to make a spring. Threads were cut on the ends of the wire, which were left long enough to reach the molars, and nuts fitted to them. Bands were then placed on the bicuspid on both sides, through which the ends of the wire were passed, and then the nuts screwed up. The wire was covered with gutta-percha to prevent rust. After the movement was started the second bicuspid was extracted to get room, and the molars were brought into service. The apparatus used was simple and comparatively inexpensive.



Dr. J. N. Crouse, Chicago, wished to emphasize the warning against the extraction of the temporary teeth,—not only the molars, but the deciduous teeth anywhere in the mouth, because it was likely to interfere with the space required for their successors. He wished especially to protest against the extraction of the temporary cuspids to make room for the permanent laterals, as, if this were done, when the permanent cuspid came there would be no room for it except outside of the arch. He thought the question as to the result of extracting the sixth-year molar should be further studied, and he hoped every practitioner would make casts, so that in the course of ten or twelve years there might be evidence which would enable them to know whether it was evil or not. He had seen many cases where the consequences were evil, and some where the results seemed good. Many ways had been shown of regulating teeth, but he would like to have a description of the best apparatus for turning incisors in the mouth where they need to be turned a considerable distance. He had tried many ways, but none suited him exactly.

Dr. C. H. Harroun, Toledo, could not answer for all cases, as each must be judged by itself. The easiest way to turn a tooth without moving it out of line was to construct a plate, fitting perfectly around the neck of the tooth to be turned, with a steel or gold wire extending around in front of the tooth; trim away the plate at the angle of the tooth, bend the spring as much as desired, and place in position. With this a tooth crosswise could be turned on its axis in twenty-four hours, and the plate could be utilized to retain it. Another method was to double the ends of a silk ligature, form a loop of the uncut end, draw it tight around the tooth, carry over and between the tooth and its approximating mate, and tie to a rubber ring fastened to a hook or staple in the plate, which must be fitted to retain its place immovably. This method must be used with care, or the tooth would be turned too much. To construct a stay-plate, select one or two (the latter preferably) teeth to clasp to; flatten a piece of piano-wire till it would pass between these two teeth, and bend it to fit nicely, with one end extending into the rubber to be used for the stay-plate.

Dr. H. A. Smith, Cincinnati, O., thought the practice of removing with a drill or fissure-bur a portion of the alveolar process upon the side of the root in the direction the tooth was to move deserved a little more attention. He had practiced it somewhat, and he found it of considerable help in very resistant teeth. By removing the mechanical difficulty in this way, the pathological condition desired might be set up. The alveolar process was very tolerant of practice of that kind. He would avoid injuring the pericementum where he could, but he thought it was not a great matter.

Dr. Frank Abbott, New York, wished to call attention to the cast aluminum plate for regulating, as it hit an idea he had put into practice with a rubber plate. It was cast over a model, so that there was a perfect fit. The advantages claimed for it were, ease of manufacture, perfect adaptation, great strength, extreme lightness, and comfort attending its wear.

Dr. W. B. Knapp, Fort Wayne, had found one of the greatest difficulties in regulating teeth on the part of parents. His remedy hereafter would be to make them pay in advance one-half the amount he expected to charge. He had many cases partially completed with satisfaction to himself and the patient, when the patient became careless and stayed away, or the parents took him away for some little trip, and all the ground gained was lost.

The Section was passed.

Section IV, Histology and Microscopy, was called, and Dr. Frank Abbott read a brief report, which called attention to a series of papers on "Development of the Teeth," by Drs. Heitzmann and Bödecker, and presented a paper by the chairman.

Dr. Abbott then read his paper entitled "Teeth of Rabbits."\*

Dr. Barrett found several points in the paper which surprised him, which he could hardly make clear without the drawings, and he wished to ask the author of the paper if there was a distinct line of demarkation between the regular enamel-rods and what he had illustrated (see Fig. 6, Dr. Abbott's paper) as the cross-layer of dentine; and as to whether the enamel-prisms in this tooth were continued, or the entire structure of enamel was changed; also, as to the direction of the dentinal fibrils in the rabbit's incisors: whether it changed, being upward in the lower portion and downward in the upper portion of the tooth. As these teeth had persistent pulps, and were continually growing, it was incomprehensible how the direction could change.

Dr. Abbott replied that in the molar of the rabbit (Fig. 6) the enamel-prisms appeared to come up just to the line of the cross-layer of dentine (so called by Tomes) and end there, but there was no line of demarkation, the one formation beginning just where the other ended, though the difference between the two was as distinct as in the drawing. In the incisors of the adult rabbit the dentinal canaliculi run upward and outward, and in the young rabbit they run downward and outward. Whether this was an indication of a difference in variety of the animal, or of change in the structure as age advanced, he could not say. On the posterior part of the tooth was a layer which was apparently hyaline or structureless, and he

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\*See DENTAL COSMOS for October, p. 605.

had never been able to satisfy himself whether it was enamel or cementum. It could be found in other places on the teeth of rabbits, even covering or partially covering the enamel, and the enamel-rods losing themselves in it.

Dr. W. H. Atkinson, New York, wanted to call attention to the differing views of different investigators. Tomes said the cross-layer of enamel was external; Dr. Abbott figured it as internal. All who had examined the teeth of the rodents had seen the stain on the external layer from the tannin in the trees they had fed upon. This staining had been differently interpreted. The same thing occurred on the necks of human teeth where the cemental structure merged into the hyaline structure. If he understood Dr. Abbott, he had not seen this external layer on the round external face of the tooth over the enamel. There was much in Owen that the workmen who cut the sections and made the drawings faithfully showed which was beyond the author. In one of his plates Max Schultze's thorns and the structure of the living-matter of Bödecker were delineated faithfully. If the workers of to-day were to go on and cancel error at every step, some time they would not have a merely negative opinion to set up against a positive assertion.

Dr. Abbott replied that if he had read Tomes correctly, he says, instead of the cement being stained the enamel was stained through and through. Both Owen and Tomes stated that there were not two layers of enamel in the hare and rabbit. He had seen two very distinct layers on molars of rabbits, as was shown in the drawing.

Dr. Atkinson. The question came up in Heitzmann's laboratory regarding these two layers. With one reagent one layer came up beautifully, and the other was unstained. Another reagent brought out the other layer and left the first. It was well known that nitrate of silver brought out some tissues, while chloride of gold stained others so as to bring them out beautifully, and as a result the charge has been made sometimes that they were overdrawn.

Dr. Barrett had, some years since, made a series of slides of the teeth of rabbits and common squirrels, and he did not know whether he could not see or was not sufficiently educated to note the change in the direction of the dentinal canaliculi, as shown in the drawings. Such a change was to him incomprehensible and inconsistent with his idea of the growth and procession of these teeth. He could not say too much for the importance and necessity of such work as was shown in this paper. If dentists wanted the recognition of scientific men they must make scientific investigations. It could not be accomplished by ordinary laboratory work. They must get at the basis of the comparative anatomy of the teeth. Such a paper as this of Dr. Abbott's rose to his conception of what the dental pro-



fession ought to be doing, and they would never rise to their proper height until they arrived as a body at a just appreciation of the importance of such work.

Dr. C. N. Peirce, Philadelphia, wished to thank Dr. Abbott, and to emphasize the thought that such work was germane to the dentist's studies. To fully appreciate the development of the human teeth, the development of the dental organs must be traced up through the lower animals to the higher types. But in this line of study the differences of function must be remembered. In the rabbit the teeth were growing throughout life; there was a constant renewal. There was what was called a permanent pulp, through the action of which there was a renewal of the parts worn off in use. A modification of structure corresponding to the modification in function might be looked for, and it was found that on the anterior or labial surface the enamel and dentine were denser than on the posterior border. In the drawings were shown projections into the pulp, corresponding, except that they were larger, with the odontoblasts of human teeth, but those running into the anterior layer, which was the denser structure, were small. In all his studies he was endeavoring to find reasons for the modification of structure, believing, as he did, that function was an important factor in the change. In human teeth there were two sets, the deciduous and permanent, the former lasting from eight to twelve years. The deciduous teeth in the rabbit were almost abortive. In a few days, or at most a few months, after birth they were succeeded by the permanent set. This was true of all the Rodentia. The deciduous teeth were almost or entirely functionless, and were either aborted before birth or were very rudimentary.

Dr. Abbott. One interesting fact to be noted was how nature had provided for the repair of teeth so rapidly worn away as were those of the animals which subsisted on vegetables. If the teeth were not growing all the time, they would soon become worn down, as the teeth of tobacco-chewers among men, and cause the animals a great deal of suffering.

The subject was passed.

Adjourned to 8 P. M.

(To be continued.)

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## SOUTHERN DENTAL ASSOCIATION.

### SECOND DAY—*Afternoon Session.*

THE Association met pursuant to adjournment, President Thackston in the chair.

The subject of Operative Dentistry was resumed.

Dr. George S. Staples, Sherman, Texas, read a paper entitled "Failure of Fillings," in which he claimed that more than ninety-five per cent. of the failures were due to lack of thoroughness. In the first instance, there was a lack of thoroughness of judgment on the part of the tutor in selecting the materials of which to make dentists, and the result was lack of compatibility between the dentist and his work. The dentist was born, not made. Some men were born slipshod, and in them there was an entire lack of thoroughness. Others were born "stingy," and they failed to thoroughly excavate for fear of getting the cavity too large, and then that they might use as little as possible of the filling material they failed to thoroughly consolidate it. Then there was the all-gold crank, who, because of his lack of thoroughness in the manipulation of other materials, decides that gold only was fit to fill teeth with. The writer was sure that the best operators, when they had a failure, would find it was due to lack of thoroughness at some part of the operation. One of the most fruitful causes of failures, he believed, was deep retaining-pits, severing the walls from all nourishment and causing them to dry and crumble. With an assistant—without which, he claimed, no one could do first-class work—to do the malleting, thus permitting the operator's left hand to hold the gold in place until thoroughly anchored, he found no use for retaining-pits. With thoroughness, let the operator first be sure that he understood his business; that he had thorough instruments; then let him use them thoroughly, and there would be fewer failures and less abuse of materials.

Dr. T. H. Parramore, Hampton, Va., read a paper on the treatment of exposed pulps. In the treatment of diseased teeth, too often the teachings of nature were disregarded. The great builder was the white blood-corpuscle, under whose influence the vital current was directed to the tissue for which it was destined, producing, in the proper environment, the perfect development of the tissue. An increased flow of blood to an inflamed part was for the purpose of helping repair, and with the proper surroundings the effort was usually successful. All were aware of the effort made by the pulp to protect itself against the invasion of caries. All dentists have excavated pulp-stones from pulps which had died slowly, and it was largely upon this physiological fact that dependence was placed in the treatment of exposed pulps. What was desired was to encourage the deposit of secondary dentine at the point of exposure instead of within the body of the pulp. The writer had used aseptic sponge for capping exposed pulps for six months, with very good success. In preparing for capping he wounded the pulp as little as possible, cleansing with the one-five-hundredth solution of bichloride of mercury; dried out, and placed the aseptic sponge directly upon

the pulp at the point of exposure. So far he had confined the practice to patients whom he could see at any time. Dr. Parramore then related a number of cases from his practice where the treatment by sponge-grafting was employed. The sponge was prepared in the usual manner for the treatment of abscessed gums. In applying it everything that he used was made aseptic.

Another point with reference to the use of the sponge-graft which had suggested itself to him, though he had never experimented with it, was as to its adaptability for root-filling. It might be forced up into the root, and he could see no reason why it would not form bone-material there. He did not know that it would, but thought the experiment worth a trial.

Dr. George H. Winkler, Augusta, Ga., read a paper on "Soft Gold Foil," by which name he wished to be understood as referring to the form of foil rendered non-cohesive by the manufacturers. Up to the time that the views expressed by Dr. Robert Arthur in 1857 were accepted, some years later, soft gold was the only kind used in filling teeth. The writer had seen fillings of soft gold foil which after enduring for thirty or forty years were still preserving the teeth. Some of them were so soft that an excavator could be readily pressed through them, but the cavities they occupied were entirely free from decay. He used in his practice soft foil, cohesive gold foil, or a combination of the two, as seemed to him best for the case in hand, and he was satisfied that the soft gold foil was most satisfactory to both patient and operator in the cavities where he used it. Soft gold foil preserved teeth at least as lastingly as any other gold; it was always used honestly for preservation, and never for show; it could be inserted easily, and so rapidly that a suitably-prepared cavity could be filled in from five to ten minutes that would require an hour to fill with cohesive; it was readily adapted to the walls, and made a filling sufficiently compact for any service; it expanded laterally under pressure, thus rendering more certain the hermetic sealing of the cavity. By his method of using—placing a comparatively thick pad of the gold against the wall from which the cavity was filled, and between the wall and the instrument—the wall was protected from being bruised or crumbled, making it extremely valuable at the cervical walls of approximal cavities, and especially in teeth of soft structure; it could be introduced into cavities difficult of access without sacrificing sound tooth-structure; it dispensed with the use of the rubber dam; it could be filed and finished with great facility and with absolute certainty, especially at the cervical margins of approximal cavities, no overhanging edges of gold being left at these points; its habitual use induced the highest appreciation of cohesive foil for cases to which the latter was adapted, and seemed to develop



manual dexterity, as soft foil operators depended for success on the strictly mechanical principles of mortising and dove-tailing, and their mechanical ingenuity was thus constantly exercised and trained.

For these reasons he believed soft foil was unquestionably the best for all simple cavities—those with walls intact—situated on the grinding, buccal, palatal, or labial surfaces, excepting the extremely small ones, and those in the form of narrow fissures, which he filled with cohesive foil; for cavities at or under the free margins of the gum; for simple approximal cavities made accessible by separating or cutting, and not requiring to be knuckled up; for approximal cavities of bicuspid and molars where the buccal and palatal walls were intact, in which, the operation being partly contour, he filled the approximal portion from the cervical wall for at least two-thirds of its extent with soft foil, completing the contour and crown portions with cohesive foil welded to the soft, made more secure by undercuts; and for crown and buccal cavities or crown and palatal cavities connected by a narrow fissure, in which cases he used soft foil for the cavities, and cohesive foil for the fissures, welding the latter to the two fillings in the cavities. The certainty with which small pieces of cohesive gold fresh from the lamp could be welded to soft foil, and the strength of the union, were incredible to those unfamiliar with the combination.

He used soft foil almost exclusively in the shape of pellets made from a square piece of foil torn from the leaf, larger or smaller according to the size of the cavity to be filled, and folded lightly upon itself, first in one direction, then crosswise, until it formed a loosely-folded mat, which was crumpled together and rolled between the fingers and thumb into an oblong pellet with one end more pointed than the other. The pointed end served as a guide to the pellet when being inserted, and the crumpling formed on every fold innumerable minute wrinkles or angles which under pressure interdigitated so thoroughly that the plug was held together with the tenacity almost of a solid mass. The preparation of the cavity was not dissimilar to the usual methods, except that he depended on undercuts, one opposite the other, and seldom resorted to retaining-pits. The first pellet was inserted against the cervical wall in approximal cavities, and against the distal wall in nearly all others, allowing part of it to lie along the bottom of the cavity, and condensing all so that it conformed to the undercut wall against which it was placed. A small portion was left protruding from the cavity to form a surplus. The other pellets were then inserted and condensed, preserving as nearly as possible the general conformation of the first until the last piece was crowded to place against the side of the cavity nearest to him. The last pellet should be inserted at the side or edge of the

cavity, because it would glide over the edge of the cavity better than over a surface of partly condensed gold, as when an excavator was driven into the filling and pressed laterally to make room for more gold. The surplus was then pressed together into the form of a cone, and the whole mass still further condensed. He preferred smooth instruments, and was very careful to avoid punching the instruments through the foil. Pressing an excavator into a partly condensed filling to make room for more gold was false in principle, and frequently unsuccessful in practice. If a cavity was found to be not full enough, the gold should be thoroughly condensed and cohesive foil welded on to complete the filling. In folding and condensing he used hand-pressure, and the automatic and lead mallets. In finally condensing he used heavy instruments for hand-pressure, and suitably formed instruments with the lead mallet; but he depended principally on plugging forceps for condensing in buccal, palatal, labial, and approximal cavities, and sometimes in cavities on lower molar crowns. These forceps were of various forms, adapted to the work they were to do, those for use on lower molars being so formed that one beak bore on a pad placed under the jaw while the other condensed the gold in the tooth. He used also what he called a "biting instrument," with which the foil was condensed by the patient biting upon a pad of block-tin.

He was governed in filling teeth by three principles: First, each pellet was so folded within the cavity that the mass formed a perfect dove-tailed mortise. Second, each pellet, as well as the mass, was carefully guarded against being punctured or torn. Third, a final, complete, and powerful condensation by means of instruments adapted to their work, and so made as to afford the power needed readily, absolutely, and safely.

The filing off and finishing of soft gold fillings was similar to the finishing of other gold plugs. He used No. 5 or No. 6 foil, as combining most perfectly the thickness necessary for strength, and the pliability which insured successful manipulation, and he was careful to avoid makes apparently weak or rotten in texture.

He expected some of his statements would be received skeptically by those who did not use soft foil, but they were all capable of the clearest demonstration. The manipulation of soft foil was an art in itself, entirely different from the art involved in cohesive operations, and every operator who failed to perfect himself in both deprived himself of superior advantages, and withheld from his patients in many cases relief from fatigue.

Dr. W. H. Morgan, Nashville, Tenn., wished to take issue with one or two points in Dr. Marshall's paper. One was that the preparation of amalgam had been greatly improved within a few years

past. The speaker's observation was exactly the reverse; the old Townsend amalgam, the first made, except that used by the Cracours, was the best. Those that turned black soonest were best for the preservation of the teeth. The discoloration, he presumed, was due to the copper in them. In earlier days every man made his own amalgam, using old quarters, which had more copper in them than they now have, and with mercury and tin making the filings into a paste. There was no discoloration of the tooth by this amalgam. He saw recently a tooth filled many years since, in which there was no discoloration, and on writing to the gentleman who had filled it he learned that an amalgam with copper in it had been used. He regarded gold as the most permanent of all filling-materials. The enemy which dentists fight was outside of the tooth. Anything that would exclude them would stop decay. Gutta-percha, while intact, if well put in, would do it. He had seen decay under all kinds of fillings. Not all leaky fillings had decay under them, but it was the exception that they did not in the end. Dr. Staples made one statement that it was not proper to pass. That was, that "dentists were not made, but born." The speaker maintained that it was education that made the man. Born dentists were few, and they were about the worst of all. If Dr. Staples's statement were true, there would be no need of education. Dr. Winkler started out with an assumption that the speaker could not pass. He thought he knew how to use soft foil. At the time he studied dentistry there was nothing else; but so far as he used cohesive gold it was better than the soft. Teeth could be preserved with cohesive foil that could not be with soft; nor could soft foil be put into a cavity quicker than the cohesive. He liked soft foil, but the very fact that the profession at large had abandoned it was the best testimony in favor of the cohesive form. He had not met a man who had abandoned the use of soft foil but who was now preserving teeth with cohesive that could not be kept with soft gold. He would dispute the assumption that it required more skill to manipulate soft than cohesive. One thing more: When a tooth filled with soft gold was worn down the filling would come out.

Dr. H. J. McKellops, St Louis, would ask if both were pure gold what was the difference between them?

Dr. Morgan replied that there was something on the surface of the non-cohesive foil which prevented cohesion. Soft foil was really cohesive. The more cohesive the softer it was. The fumes of ammonia would make cohesive foil the same as the soft. Portions of it would slip over the surfaces of other portions just the same.

Dr. Winkler did not oppose the use of cohesive foil, and he hoped



gentlemen would not waste time putting him on that side. He used cohesive foil, and admired and appreciated its fine qualities, and he thought most soft foil operators did so.

Dr. Staples did not mean that the dentist was born fully equipped. Whoever would be a successful practitioner must use every opportunity to educate his faculties; but there were some men who could not make a hoe-handle, and such men could not become even fifth-rate dentists.

Dr. John C. Storey, Dallas, Texas, thought that "*poeta nascitur non fit*" might well be paraphrased, "*dentista nascitur non fit*." Some men went to college and when they were through put up their diploma in their offices, and that was as far as they got. They were not dentists. Men made their sons "doctors;" they couldn't put them to the plow,—it would be beneath their dignity. So the young man started in a fine office and starved as a physician. Unless there was something in him to adapt him for it he had better never begin. As to Dr. Winkler's paper, he was gratified to know that there were some men who could fill teeth successfully with soft foil. For himself, he had never seen a tooth so filled that would not have been better filled if cohesive foil had been used. He had never been able to be sure of saving pulps when they were exposed, and one of the main reasons of his being here was to endeavor to learn how it might be done. If he could accomplish this he would feel that his long journey was well repaid. He would try the method described by Dr. Parramore, which theoretically, at any rate, promised success.

Dr. M. C. Marshall would ask Dr. Morgan if the amalgam which to-day saved the teeth into which it was put was not better than one which discolored it?

Dr. Morgan replied that what he had meant to say was that an amalgam which itself became discolored saved the tooth better than one which discolored the tooth.

Dr. H. E. Beach, Clarksville, Tenn., thought the middle ground the true position. He who would save the greatest number of teeth must be able to use any form of gold not only intelligently but skillfully. The idea that it required more skill to use one than the other was fallacious. It required skill to properly manipulate either form; it required skill to use the plastic materials properly. Thus if one wanted to make a good filling of os-artificiel or of oxychloride, he must be careful not to have any air-bubbles in the mass. If one wanted to make a success every time, he should not confine himself to the use of cohesive gold exclusively. If he did he would deprive himself of many advantages, and his patients of many teeth that could be saved with something else. He did not believe that the

most frequent cause of failures was a lack of knowledge how to manipulate, but a want of judgment as to the proper material to use.

Dr. J. B. Hodgkin, Washington, D. C., read a paper on "Amalgam," of which the following is a synopsis:

Dr. Hodgkin, by a large number of citations from experiments with amalgams, showing the variations in behavior of various alloys, deduced the conclusion that notwithstanding all that had been written on the subject, we knew practically little about amalgams; that, owing to differences in crystallization of the various components, complexity of structure—the intrusion into the body of many constituents—was of doubtful utility from a philosophic stand-point. Those amalgam fillings most notoriously good, so far as strength was concerned, were those which were simple, not complex; and so far the verdict of those who used amalgams was that those which turned dark were the best tooth-preservers. The writer's aim in preparing the paper was not to decry amalgams, only so far as they were unreliable; but to warn young men against those who were selling the "best" amalgam or bringing into the market an article "which cannot fail to do what the maker promises."

Adjourned to meet Thursday evening at 8 o'clock P. M.

### THIRD DAY.

The greater portion of the day was devoted to clinics. Very excellent arrangements had been made for the convenience of the operators and those who wished to witness their work, and a large number of operations were performed by prominent specialists from various parts of the country. In the afternoon a large number of those in attendance enjoyed an excursion across the bay to the city of Norfolk.

### *Evening Session.*

The discussion of Operative Dentistry was again resumed.

Dr. E. R. Beadles read a paper on "Dentistry, the Old and the New," which was a general view of the advances made in the art as now practiced over the methods of early days.

Dr. Winkler said that this association met as a body of scientific men. Its reports went out to the world and the attainments of its members were judged by them. He was unwilling to sit still and allow wrong opinions to go forth from this body without entering his protest. During the discussion yesterday the question was asked, what was the difference between soft and cohesive foil, and in the reply that was made it was stated that ammonia upon the surface would prevent the cohesion of different portions of the gold. He wished to state as a fact that ammonia would not prevent cohesion, and he was prepared to prove his assertion. Some years since

he had proved that ammonia would not accomplish what had been claimed for it, but that sulphurous acid fumes would; and that the sulphurous acid could be driven off by heat. Another method used to prevent the cohesion of gold was the addition of a small quantity of silver or some baser metal, not to cheapen the foil but to destroy its cohesive quality.

Dr. Morgan presumed that Dr. Winkler referred to him. He did not say that ammonia was what was used by the manufacturers to destroy the cohesion of gold, but that it would do it. It had done so in his hands. As to the addition of a small quantity of silver for the same purpose, gold with six per cent. of silver could be made cohesive. He would make the experiment with ammonia fumes in the morning. In the meantime he would ask Dr. Patrick if ammonia would not render gold non-cohesive.

Dr. J. J. R. Patrick, Belleville, Ill., replied that it would, and so would dust, grease, or anything else.

Dr. R. Finley Hunt, Washington, D. C., objected to the use of the term "soft gold." Gold was either cohesive or non-cohesive. There were only two conditions. Soft gold was really cohesive, as Dr. Morgan had said. Correct names should be given to things.

Dr. Morgan, referring to the paper by Dr. Beadles on the progress in dentistry, apprehended that, in some respects, at least, the progress had not been so great as it would appear. For instance, the method of root-filling substantially as practiced to-day by a very large proportion of operators had been described by Dr. Ballard in 1854—55.

The subject of Operative Dentistry was passed.

The Committee on Mechanical Dentistry was called, and Dr. J. Rollo Knapp, the chairman, reported one paper by Dr. A. H. Hilzim, Jackson, Miss., which was read by title.

Dr. Hilzim, in his paper, which was entitled "Smooth Plates a Preventive of So-called Rubber Sore Mouth," described his method of making the surface of vulcanite plates next to the mucous membrane absolutely smooth and glazed as a preventive of "rubber sore mouth." First, be sure you have a smooth and accurate impression. To prepare plaster, after procuring the proper quantity of milk-warm water, sift in the plaster gradually, only adding as the water absorbs it. When the water has taken up all it will, stir gently and pour, being careful to settle the first part in the cup, by jolting on the bench. When wax or modelling composition is used do not immerse in hot water, but separate by dry heat. Remove any inequalities that may exist and cover the model with No. 6 tin foil. Having ground the joints square and articulated the teeth, cover the joints on the outside with thin oxyphosphate and imbed. When the flask is separated, leave the tin foil



adhering to the wax base-plate and cover the model with No. 20 tin foil. Remove the wax from the female portion of the mold by turning the wax back carefully at the "heels" and then lifting it out. Then cover the inside joints with oxyphosphate, heat both sides of the flask, soften the rubber over hot water, give the female model a good coating of liquid silex and pack. When the plate comes out you will have very little to do except to trim off some thin edges of rubber, and you will have after peeling off the tin foil two glazed surfaces that will not produce sore mouths.

The subject was passed.

Dr. Morgan, chairman of the Committee on Dental Education, reported that there were no papers from his committee to be read, whereupon the subject was passed.

(To be Continued.)

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### VIRGINIA STATE DENTAL ASSOCIATION.

At the annual meeting of the Virginia State Dental Association, held at the Hygeia Hotel, Old Point Comfort, the following were elected officers for the ensuing year:

W. W. H. Thackston, president; T. H. Parramore, first vice-president; L. M. Cowardin, second vice-president; J. W. Foreman, third vice-president; J. Hall Moore, corresponding secretary; Geo. F. Keese, recording secretary; J. F. Thompson, treasurer; D. N. Rust, F. A. Lee, and W. H. Gingrich, executive committee.

The selection of the place for the next meeting was intrusted to the executive committee.

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### NEW ENGLAND DENTAL SOCIETY.

At the twenty-fifth annual meeting of the New England Dental Society, held at Boston, Mass., October 5-7, 1887, the following officers were elected for the ensuing year:

A. M. Dudley, president; C. A. Brackett, first vice-president; C. W. Clement, second vice-president; A. H. Gilson, secretary; W. P. Cooke, assistant secretary; G. A. Gerry, treasurer; E. O. Kinsman, librarian; R. R. Andrews, H. A. Baker, G. C. Ainsworth, W. E. Page, and T. W. Clements, executive committee.

The selection of the time and place for the next meeting was left with the executive committee.

A. H. GILSON, *Secretary*,  
150 Tremont St., Boston, Mass.

### MINNESOTA STATE DENTAL ASSOCIATION.

THE following are the names of the officers elected at the last meeting of the Minnesota State Dental Association, held in Minneapolis, July 13-15, 1887:

H. L. Cruttenden, president; E. H. Angle, vice-president; D. W. Edwards, recording secretary; L. C. Gould, corresponding secretary; H. M. Reid, treasurer; L. C. Gould, C. H. Goodrich, J. M. Welch, M. G. Jenison, and C. H. Robinson, executive committee.

The next meeting will be held in St. Paul.

D. W. EDWARDS, *Secretary*,  
Le Sueur, Minn.

### PENNSYLVANIA ASSOCIATION OF DENTAL SURGEONS.

At the annual meeting of the Pennsylvania Association of Dental Surgeons, held October 11, 1887, the following gentlemen were elected officers to serve for the ensuing year:

E. H. Neall, president; Howard E. Roberts, vice-president; Theodore F. Chupein, recording and corresponding secretary; W. H. Trueman, treasurer.

THEODORE F. CHUPEIN, *Secretary*,  
1408 Pine St., Philadelphia, Pa.

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## EDITORIAL.

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### THE NINTH INTERNATIONAL MEDICAL CONGRESS.

THE fact is worthy of record that, in the same year in which was celebrated the hundredth anniversary of the adoption of the Constitution of the United States, American dentistry has been formally recognized as an integral part of one of the learned professions, and participated as such in the International Medical Congress, of which it numerically constituted fully one-sixth, although nominally the last of eighteen sections into which the Congress was divided. The number registering as members of the general Congress was short of three thousand, the Dental Section making nearly five hundred of this number.

To the action of the American Medical Association in placing a properly-conferred degree of D.D.S. on the plane of medical degrees for the purposes of professional fellowship the large attendance of dentists was in great measure due. The stimulus thus imparted at nearly the eleventh hour, when general apathy, if not indifference, to the success of the Congress prevailed, went far towards assuring the successful result, upon which the profession may now be congratulated.

As usual, to a few individuals is due the credit of this honorable outcome. Whenever and wherever an undertaking proves successful it is because some earnest, clear-minded, energetic persons have persistently planned and labored to that end, and we have here another instance illustrating the fact. The Congress, if not all that could have been hoped, was an undoubted success, and the Dental and Oral Section clearly and creditably contributed thereto. In the matter of financial support it not only provided liberally for its own expenses, but gave generous aid to the general fund. Its local committee was unsparing in its attentions to and provision for the many wants of those in attendance, and it is but just to accord a full measure of commendation to all who were officially concerned in the conduct of the sessions.

Apart from the scientific aspect of the meetings and clinics, the social features were unquestionably enjoyable, and many friendships were formed which will continue during life. The social occasions were numerous, and were evidently thoroughly appreciated. The foreign visitors were cordially received, and expressed themselves as highly gratified by the attentions of their American confrères.

The year will be memorable in many respects, but to dentists it will be especially so in its record of the proceedings of the American Dental Association, the Southern Dental Association, and the Dental and Oral Section of the Ninth International Medical Congress, convened in widely separated places, within a period of forty days, and yet each well attended, and each meeting of more than ordinary interest.

It is to be said that the subject of individual membership in the Congress by mere registration is open to serious question, inasmuch as the fact is beyond doubt that some persons registered and participated in the proceedings of sections who were neither qualified nor worthy to be received into membership. Such a misfortune would be rendered improbable of renewal by the adoption of the representative, the delegate, or a credential-committee method of admittance.

This brief record brings out distinctly the fact that a strong professional sentiment has become an inspiring and energizing motive in the mind of this youngest of the medical family, and is prophetic of great advances in dental science ere *its* centennial shall come to be celebrated in discoveries, achievements, and improvements unimaginable to-day.



**FIRST DISTRICT DENTAL SOCIETY, STATE OF NEW YORK.**

THIS enterprising society is making preparations to hold its Nineteenth Anniversary on the 16th, 17th, and 18th of the coming January, and expects to break its previous record. It will, doubtless, be a notable occasion. The journals for December will contain fuller information of its arrangements.

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**BIBLIOGRAPHICAL.**

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**THE AMERICAN SYSTEM OF DENTISTRY.** In Treatises by Various Authors. Edited by WILBUR F. LITCH, M.D., D.D.S., professor of prosthetic dentistry, etc., in the Pennsylvania College of Dental Surgery. Volume III.—Anæsthesia and Anæsthetics; Physiology of Digestion, Voice, and Speech; Associate Dental and Oral Pathology; Oral Surgery; Eruption of the Teeth; Materia Medica and Therapeutics; Metallurgy; Jurisprudence. With 301 illustrations. Royal octavo, pp. 1024 and index. For sale by subscription only. Complete in three volumes. Price, per volume, cloth, \$6.00; leather, \$7.00; half morocco, gilt top, \$8.00. Philadelphia: Lea Brothers & Co., 1887.

The third and final volume of this most complete and comprehensive presentation of the science and art of dentistry which the world has yet seen is now before the profession.

Taking up the several chapters in their sequence, Dr. Wilbur F. Litch, in a chapter of nearly two hundred pages, entitled "Anæsthesia and Anæsthetics," gives the history of anesthesia and the various agents used for its production; the anesthetic procedure, its dangers, and the treatment of untoward symptoms; the relative merits of the various anesthetics, their physiological and secondary effects; local anesthetics or obtundents, rapid breathing, etc., making perhaps the best résumé of the whole subject which has yet appeared.

Dr. Albert P. Brubaker follows with a consideration of the "Physiology of Digestion," including prehension, mastication, insalivation, deglutition, gastric and intestinal digestion,—a methodical and careful condensation of the topic.

The next essay is a profusely illustrated and admirable discussion of the "Physiology of the Voice and Speech," by Dr. Carl Seiler.

The succeeding chapter, upon "Diseases Incident to the First Dentition," by the editor of the DENTAL COSMOS, may be passed without comment here. It will probably receive merited criticism elsewhere.

Dr. Alton Howard Thompson, in elucidation of the subject of

"The Cause of Congenital Defectiveness and Deformity of the Teeth," studies deviations from normal type as dependent upon the following causes: First, deficient nutrition; second, diseased nutritive fluids; third, imperfect formative organs; fourth, diseased formative organs. All these he classifies as the physiological *methods* by which aberrations of nutrition or function may affect the developing teeth. The extraneous causes of such disturbances influencing the nutritive fluids or the formative organs or both disadvantageously, he discusses under heredity, miscegenation, civilization, food, nervous disturbances, diseases congenital or acquired, drugs, and artificial diseases. The congenital diseases believed to affect the development of the teeth, and each of which the author considers separately, are syphilis, scrofula, rachitis, tubercle, scurvy, arthritis, and malaria; the acquired diseases,—variola, scarlatina, measles, varicella, stomatitis, and intestinal disturbances. Allusion is also made to insanity, lunacy, feeble-mindedness, puberty, nasal catarrh, whooping-cough, tonsilitis, and cataract, in their relations to the quality of the permanent teeth. Brief reference is also made to the effect of drugs and artificial diseases—mercury, tobacco, alcoholism, opium, vaccinia, thumb- and tongue-sucking, accidents and injuries. The following gives the conclusion of the writer, and we call special attention to the closing sentence: "In epitomizing the whole subject which we have elaborated at so much length, we may conclude that the one great cause of dental degeneracy and defective dental tissues, whatever the seeming antecedent, is *physiical degeneracy*. Occupying the position of organs peculiarly susceptible to alterations of nutrition, they quickly report any deficiency or impairment of the nutritive supply either in quantity or quality. The causes of the impairment we have attempted to classify and describe with some minuteness as well as comprehensiveness, but fail, of course, of covering the whole ground or of giving a complete résumé of the subject. One of the principal difficulties to be encountered in the work is the scarcity of recorded observations and of systematic investigation. It is a field of wonderful richness, inviting and challenging the physiologist and pathologist to enter and reap the reward of brilliant discoveries in store for them."

A fitting contribution follows in a chapter upon "Anomalies of the Teeth and Maxillæ," by Dr. S. H. Guilford, in which variations from the normal type are considered in relation to each other and to the conditions influencing or attending their existence.

"Inflammation of the Mucous Membrane of the Oral, Nasal, and Pharyngeal Cavities" receives intelligent treatment at the hands of Dr. W. X. Sudduth.

"Oral Surgery" finds able exponents in Dr. Louis McLane Tiffany and Dr. John H. Packard.

A creditable essay is that of Dr. C. N. Peirce upon "The Eruption and Structural Relations of the Deciduous and Permanent Teeth."

Dr. Henry Leffmann makes a careful condensation of "*Materia Medica and Therapeutics*," in a little over one hundred pages.

The section on "Dental Metallurgy," by Dr. Edward C. Kirk, is an attempt to present in a comprehensive manner the science of metallurgy in its relations to dentistry. A systematic consideration of the general properties of the metallic elements, and their classification in groups according to the properties which certain of them have in common, their relations and the compounds or alloys which they form with each other, is followed by a special study of the mercurial alloys, or amalgams; after which the more important compounds of the metals with non-metallic elements are described. Methods and means employed in the melting and mixing of metals, and an elucidation of the principles involved in the operations of soldering, are quite fully presented. The various metals used in every department of dentistry are comprehensively treated of,—their physical and chemical properties, their dental applications, alloys, and compounds. The chemical methods for the detection of any particular metal in the presence of other bodies, and its quantitative estimation, are described. The chapters upon gold, silver, iron, platinum, and mercury are especially full. A short description of the principles and methods of electro-metallurgy completes the section. The author seems to have made constant effort to elucidate by careful explanation the principles involved, thus giving it a scientific basis and suggestive breadth of application.

A very important section is the closing one on "Dental Jurisprudence," by Charles G. Garrison, M.D., treating of the relation to the law in which the dentist stands by reason of his being a practitioner of dentistry.

If time and space permitted, we should take great pleasure in a closer analysis of the various sections of the three volumes comprising "The American System of Dentistry." That they contain much that is open to criticism is undoubtedly true; that they have exhausted the subject, no one will affirm. On the other hand, it cannot be questioned that the dental profession of the world will be under lasting obligation to the enterprising publishers and to the faithful editor for the production of so practical, so comprehensive, and so thorough a "System." We feel assured that this work—the culmination of efforts which in the last two decades have placed the profession of dentistry on a high plane of scientific advancement and of recognition—will contribute in marked degree to its further progress in usefulness, self-respect, and public and professional regard.



**LESSONS IN GYNECOLOGY.** By WILLIAM GOODELL, A.M., M.D., professor of clinical gynecology in the University of Pennsylvania, etc. Third edition, thoroughly revised and greatly enlarged. With 112 illustrations. Octavo, pp. 573 and index. Price, cloth, \$5.00; in full sheep, \$6.00. Philadelphia: D. G. Brinton, 1887.

This valuable book, which has for a long time been out of print, will be gladly welcomed by the medical profession. The evidences of careful revision are manifested throughout the volume, as is also the very considerable amount of fresh matter added to every lesson, the number of which has been increased by six. These lessons or chapters now number thirty-nine, illustrated by one hundred and twelve cuts, and cover very thoroughly the entire field of gynecology.

The author has an unusually happy faculty for conveying his meaning—indeed, we know of no medical author who excels Dr. Goodell in perspicacity of style. In addition, he is an earnest and conscientious teacher, and he must be a dull student who would fail to understand or to be benefited by the study of any one of these “lessons.”

**DIFFERENTIAL DIAGNOSIS: A Manual of the Comparative Semeiology of the More Important Diseases.** By F. DE HAVILLAND HALL, M.D., assistant physician of the Westminster Hospital, London. Third American edition, thoroughly revised and greatly enlarged. Edited by FRANK WOODBURY, M.D., professor of therapeutics and materia medica, etc., in the Medico-Chirurgical College. Small octavo, pp. 251 and index. Price, cloth, \$2.00. Philadelphia: D. G. Brinton, 1887.

This work is founded upon the well-known Synopsis of Dr. F. De Havilland Hall's “Diseases of the Larynx, Lungs, and Heart,” but has been extended to embrace all the more frequent and important diseases. The author has held especially in view the early and often overlooked signs of the presence of disease, and the classification of whatever symptoms are alleged on good authority to be pathognomonic of pathological conditions.

In the arrangement of the text diseases are divided into two great classes—general and local. General diseases are again divided into two morbid groups—fevers and diseases of the blood; and each of these is again divided into sub-classes marked by certain symptoms which are guides to the diagnostician. Local diseases are classified with reference to physiological function rather than to anatomical divisions of the body—the nervous, muscular, and osseous systems, and the several organs forming the respiratory, circulatory, digestive, and urino-genital apparatus.

A valuable book for either student or practitioner.

DRUITT'S SURGEON'S VADE-MECUM: A Manual of Modern Surgery. Edited by STANLEY BOYD, M.B., B.S.Lond., F.R.C.S.Eng., assistant surgeon and pathologist to the Charing Cross Hospital, etc. Twelfth edition. With 373 wood engravings. Octavo, pp. 962 and index. Price, cloth, \$4.00; sheep, \$5.00. Philadelphia: Lea Brothers & Co., 1887.

Ten years have elapsed since the previous edition of this valuable Vade-Mecum appeared. In view of the advances in surgery made within the last decade, it will not surprise the reader to be informed—as the author states in his preface—that “scarcely a paragraph remains unaltered.”

It is claimed that fifty thousand copies of former editions of this book have been sold in England. In America a copy was issued by the Government to each surgeon serving in the Union army during the war of the Rebellion. This later fact, however, was doubtless because it was then a compact manual; but it is no longer such, and has neither the manual form nor the completeness of the more exhaustive works on surgery by American authors. Notwithstanding, in a profession taxing the resources of the wisest and the best, the addition of this volume to the practitioner's library is a necessity if he would be thoroughly acquainted with all the methods practiced in modern surgery.

THE PHYSICIAN'S VISITING LIST (Lindsay & Blakiston's) for 1888. Philadelphia: P. Blakiston, Son & Co.

The thirty-seventh year of continuous publication of this well-known Visiting List is a sufficient testimonial to its practical value. All the good features which have hitherto rendered it a favorite are retained, and many improvements have been added. The first thirty pages are utilized for condensed medical information, useful tables, list of disinfectants, etc. The price varies from one to three dollars, according to size, etc.

#### PAMPHLETS RECEIVED.

Transactions of the Indiana State Dental Association, twenty-ninth annual meeting, held at Lake Maxinkuckee, Tuesday, June 28, 1887, continuing four days. Published for the Association, by Mrs. W. M. Herriott, Indianapolis, Ind., 1887.

Transactions of the Illinois State Dental Society, at the twenty-third annual meeting, held at Jacksonville, May 10 to 13, 1887. Chicago: Published for the Society, 1887.

El Arte Dental, Organo de la Sociedad Odontologica Nacional Mexicana. Revista Nacional y Extranjera de la Profesion en Medicina, Cirugia y Protesis. Redaccion y Administracion, Casa Dental Mexicana del Dr. Brito, Mexico. Vol. I, No. 4, Octubre 1, 1887.

## OBITUARY.

### DR. FRANK G. LEWIS.

DIED, at McGregor, Iowa, July 31, 1887, Dr. FRANK G. LEWIS, in the thirty-second year of his age.

Dr. Lewis was born in Springfield, Mass., February 27, 1856. He began the study of dentistry at an early age with Dr. E. L. Clark at Dubuque, and commenced practice at Webster City, Iowa; then removed successively to McGregor, Minneapolis, and Jacksonville, Florida.

Dr. Lewis was an ambitious and skillful practitioner, and personally popular with his associates and with those with whom he came into social or professional relations.

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## HINTS AND QUERIES.

**IMPLANTATION.**—Who first performed the operation of implanting a natural tooth in a socket artificially formed in the human jaw, and in what publication was that operation first described?—A. W. S.

**ARTIFICIAL TEETH "ON EDGE."**—I have a patient who is troubled by her artificial teeth becoming "on edge." Simply drawing the finger across the teeth gives considerable pain. The trouble is also communicated to the natural teeth, and causes them to become "on edge" also; but the sensation ceases instantly when the artificial teeth are removed. The plate is a partial one supplying the loss of the superior second bicuspid and the six oral teeth. It was made of vulcanite, has no clasps, and extends just back of the second molars. It has been worn comfortably for four or five years, and the trouble in question has been present at intervals for the past year or more. What is the cause and remedy?—BROOKLYN.

To A. A. H., in Hints and Queries, August COSMOS, 1887, I would say: In taking impressions of soft and flabby mouths, anything but plaster is decidedly contraindicated. Mix the plaster thin; do not put in much salt or sulphate of potash, as there should be no great hurry for the impression plaster to harden rapidly. Introduce it to the mouth quite thin, using not more than sufficient to take a good impression; raising the lip with the thumb and two first fingers, thus enabling the tray to be carried to place with a slight lateral motion. This will allow the soft ridge to remain as near as possible in a normal position. Allow the plaster to set perfectly before removal, and while your patient is with you trim the model where the softest tissue exists in the mouth. This is done with the view of producing an even distribution of pressure. A little experience will determine the requisite amount in different cases. Right here I would say that I have met with but few cases, and those only partial ones, where it was not necessary to trim the model in order to secure the desired results.—W. MITCHELL, D.D.S., London, Eng.

To A. A. H.'s query, in the August number of the DENTAL COSMOS, I will say: For taking impressions, there is nothing equal to plaster of Paris. Just how



thick or how thin it should be mixed can be determined by experiment easier than it can be described; however, it should be sufficiently thick that it may be slightly heaped in the impression-cup.

First, carefully examine the mouth as to whether it has a high-arched palate or otherwise. Build on to the posterior edge of the impression-cup to be used a thin wall of wax, to conform as near as may be to the arch. This serves a two-fold purpose,—first, it raises the soft palate slightly above its normal position; second, it prevents the plaster being forced back into the throat and nauseating the patient. The lifting of the soft palate in taking the impression is a most successful means of securing proper suction, in which case the plate when finished should extend, say one-tenth of an inch, beyond the hard palate on to the soft.

Dissolve a teaspoonful of salt in the water with which you mix your plaster, to hasten its setting; mix thoroughly and quickly. When transferred to the impression-cup, hasten to the mouth; direct the patient to relax the buccal and labial muscles; insert and press to place; immediately relax the pressure in front, allowing the cup and contents to slightly drop, in order that the soft and flabby tissues may resume their normal position, keeping at the same time slight pressure on the posterior edge of the cup, so as to keep the soft palate lifted until the plaster has set.

No vacuum-chambers are necessary. If the hard palate has but little soft tissue covering it, remove a thin layer from the impression in that region by scraping before pouring the cast.—S. H. K., Lincoln, Neb.

#### TO THE EDITOR OF THE DENTAL COSMOS:

SIR: I read in the September number of the DENTAL COSMOS the remarks of Dr. L. D. Shepard, of Boston, made before the National Association of Dental Examiners, regarding the dental law of Massachusetts. Dr. Shepard is credited by you with the following statement: "Last year one man, without consultation with other practitioners, took it upon himself to get up a law and work it through the legislature."

I wish to say in reply to this, that Dr. Shepard has, I presume unintentionally, misstated the facts. Before the bill in question was presented to the legislature a printed copy was sent to Dr. Shepard, together with a letter asking for his opinion of the proposed law. Not only was a copy and letter sent to Dr. Shepard, but to every known dentist in the State. Hundreds answered these letters, among them many of the leading dentists of Massachusetts, and a large majority of the answers favored the bill as drawn. While in the hands of the legislative committee, a notice was published in the daily papers of Boston, informing all interested parties that a public hearing would be held at the State House at a stated time for the purpose of showing the merits or demerits of the bill. At the hearing there was a large attendance, both of dentists and others, including representatives of the Harvard and Boston dental schools. The bill was amended by the committee, and passed in its present form. Therefore, in view of the misstatements with which Dr. Shepard is credited, and in justice to the proponents of the bill, who sought to be open and fair in all their transactions, and used every endeavor to bring the proposed action to the knowledge of every dentist in Massachusetts, it is no more than just that this correction should be publicly made.—LEWIS T. FOSS, Boston, Mass., September 22, 1887.

# THE DENTAL COSMOS.

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VOL. XXIX.      PHILADELPHIA, DECEMBER, 1887.

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No. 12.

## ORIGINAL COMMUNICATIONS.

### THE COMBINATION OF METALS FOR FILLING TEETH.

BY DR. C. T. TOCKWELL, SPRINGFIELD, MASS.

(Read before the New York Odontological Society, October 3, 1887.)

FOR eight or ten years past I have been endeavoring, by experiment and observation, to determine the value, or otherwise, of a combination of metals over a single metal as material for filling teeth. As a result, I have arrived at certain well-defined convictions. But in considering the matter with reference to a response to your invitation to write upon the subject, for this occasion, I am reminded of a prominent author's exclamation when shown that others had long since given voice to substantially his own thoughts with reference to certain matters. I will not say with this author, "Confound those ancients who are always stealing my ideas," but rather that I am happy—on this occasion at least—in the fact that the experience and observation of so many may be cited as agreeing in the opinion that a combination of metals is of much greater value, in many cases, than any one of the various metals used alone.

As far as I am informed, there is a universal agreement, on the part of those who have given the matter any extended experimental attention, in regard to the *saving* qualities of certain combinations of metals. Personally, I do not hesitate to assert that the employment of a combination of metals as a filling-material is eminently successful as a means of prolonging the usefulness of a very large class of teeth. However much may be claimed in favor of gold, or any other metal, I am fully convinced that every operator is often called upon to deal with cases where a combination of metals is far preferable from the stand-point of *comfort* to be derived and the *durability* of operations. Tin and gold, for instance, combined in the same cavity, express a preservative power that either, used alone, fails to exhibit.

This is a matter of such universal acknowledgment, and doubt-

less one so generally acted upon by those present, that I shall not affront your intelligence or courtesy by occupying any time in the attempt to demonstrate the fact. A benefit may, however, be derivable from a comparison of individual methods of practice, and by a study of the relations that exist between the resulting phenomena—when a combination of metals is used—and the cause, or rather the antecedents, of such phenomena.

I will dwell briefly upon these two points:

First, as to the general methods which, in my own practice, have been found to be most satisfactory, together with the resulting phenomena observed.

For some years past, the combinations that I have used consist entirely of amalgam and gold, and "Robinson's fibrous and textile metallic filling" and gold. The latter, for the sake of brevity, I shall hereafter designate by the term of "Robinson's foil." When employing the above combinations they are, of course, used in the order named. In the majority of cases I adopt the amalgam and gold combination; but of late, as the result of observation, I am using more extensively the Robinson foil and gold combination. This is so, partly, because of the fact that by this combination operations can be completed at a single sitting; but more especially because of the most excellent results observed.

Robinson's foil is found valuable in starting large crown fillings that are to be finished with gold. But the cases where it serves the best purpose are in starting fillings on the approximal surfaces of teeth, especially of the bicuspid and molars, when not too badly broken down. Enough of it should be used to form, when finished, an external border of this metal at the cervical margins of the cavity, else the good effect will not be so apparent. If, however, the tooth is badly broken down, or it is of a soft, frail texture, my usual method is to start the filling with amalgam, and at a subsequent sitting finish with gold. My general practice is to restore the normal contour of the tooth with amalgam, at the first sitting, and subsequently cut away such portions of the amalgam as may be deemed desirable, replacing the same with gold, so that when finished, especially with the anterior teeth, nothing but gold shall appear to ordinary observation. This is not a difficult task in any save the most extreme cases. Good anchorage may be secured in and around the amalgam, and the gold can be so placed as to conceal from view all traces of the amalgam. A sort of chemical union takes place between the gold and amalgam, so that from a comparatively slight point of anchorage the gold may be built up and carried well over a slightly-rounded edge of amalgam, thus hiding it from view. The amalgam will become dark in shade, and perhaps black, but the gold retains its native appearance.



In almost any case of badly broken-down teeth the original contour of the crown may be easily restored with amalgam, even if the natural crown is almost or quite gone, and when once hardened it can as easily be faced with gold. In the case of incisors and cuspids, and often the bicuspid also, the amalgam should be cut away along the entire anterior surface, in order to avoid discoloration of that portion of the remaining tooth. In rare cases I find it advisable first to fill the anterior surface with gold, and finish by the use of amalgam in that part of the cavity which presents itself on the lingual surface.

By the use of amalgam and gold many cases are successfully treated that otherwise would have to be "crowned;" and I believe that it affords, in effect, a more substantial and permanent crown than would result from any method with which I am acquainted. I have restored several crowns of superior cuspids in this manner which have done excellent service for six or more years, and which seem to-day as promising as when the work was done.

So much as regards methods. I need hardly remind you that I am not advocating this practice without discrimination as regards the class of teeth which come into our hands for treatment. Where the teeth are hard, strong, and well-conditioned, gold is good enough and will serve an excellent purpose. But when we have to deal with that large and utterly disheartening class denominated "soft" teeth, manifesting that treacherous, rapid character of disease called "white decay," accompanied by characteristic environments and constitutional tendencies, we stand before a condition of affairs that challenges a broader and wider treatment than lies within the resources of a mere gold hobbyist. The various cements and plastics may be and are used extensively; but the necessity of frequent renewals is discouraging to patient and operator alike. Whereas with the method I have described, among the several and important advantages that I will notice are:

First, the relative permanency of such work. I have never yet had to remove, replace, or patch a single case.

Second, it affords an economy of time, labor, and consequently of expense, to the patient.

Third, and more important, cavities may be filled in this way and no disagreeable and dangerous thermal effects follow, which, if filled with gold or amalgam alone, would cause the patient much discomfort, to say the least. If a combination of metals as a filling-material possessed no other advantage over any one used alone than that of materially lessening the subsequent thermal influences upon the pulp, it would be sufficient to demand our serious consideration. An entire paper might well be written, taking for its subject this point

alone. Just here it is where Robinson's foil is found to be of so much value in starting large crown cavities which are to be finished with gold. I believe its use in crown cavities results in other advantages than that of an avoidance of thermal effects, but this is the one most apparent.

Fourth, and by way of hypothesis, I wish to remark that in all my experience with this method—covering some ten years of time and hundreds if not thousands of cases—I have never had a single case where, to my personal knowledge, a pulp has died under one of these combined metal fillings. Furthermore, I am pretty well convinced that if a pulp should die under these circumstances no putrefaction would occur, and consequently no abscess would follow.

Thermal influences will account for the death of thousands of pulps under gold fillings, and this is the beginning of a series of events which result in abscesses. But there are other effects brought about by the combination of metals than that of the avoidance of thermal influences, and which in my judgment are calculated to aid in the preservation of the life of the pulp, or, in case it does become devitalized, to prevent those chemical changes that result in inflammation and abscess, to which allusion will be made as we proceed.

Fifth, I think it may be said that there invariably follows an improvement in the physical condition of the teeth when either of the combinations I have named is used; such an improvement as would not follow if either of the various metals was used alone. I might cite hundreds of cases in my own practice in support of this position,—teeth that were soft, frail, and subject to rapid decay; teeth that had been filled with gold and the whole list of plastic materials, and still persisted in going to destruction in spite of renewals early and often. Many such cases have come into my hands, and are now being "saved" by resorting to the treatment and methods I have described. Cases can be presented where I think it may be safely said that fillings made of a combination of metals have already done good service for more *years* than may be numbered by the *months* of former fillings of gold and the various plastics. These cases of soft, frail teeth, when treated in this way, seem to, and I am convinced do, become stronger and more dense in a comparatively short time.

There is, therefore, more involved in this method of treating a certain class of teeth than the mere *mechanical adaptation* of the materials used and the *mechanical exclusion* of outside deleterious agents, whatever they may be. With all due respect for those who hold views to the contrary, I am firmly convinced that, as a result of this combination of metals, a therapeutic effect is realized and a physiological stimulus is engendered which will, in a large measure, account for the favorable phenomena observed.

We are brought thus to our second point,—the relation that exists between the resulting phenomena and the antecedents of such phenomena.

On a former occasion, before another society, my views were given at some length relative to this point. Further observation and consideration have failed to change these views to any material extent. I then stated that, in my judgment, the effects above named may all be primarily accounted for upon the theory of *galvanic action* as a basis of causation.

In regard to the question of thermal influences, there is no doubt but that Robinson's foil is a better non-conductor than gold; and this would, in part at least, account for the immediate favorable results. But there can also be little doubt that the galvanic action set up by this combination, taken in connection with the fluids of the mouth, lends an impulse toward the removal of those physiological sensations resulting from thermal influences. There can be no doubt at all that the combination of amalgam and gold, when placed in contact with the teeth and fluids of the mouth, will create an electric current. And I am assured by competent authority that, when a tooth is so filled, the current will flow in the following direction, viz., from the amalgam down through the body of the tooth to the pericementum, from it to the saliva, and from it or through it to the gold. Now, if this is true, there follows a very significant fact, and one that should be particularly noted: The cervical border of a cavity so filled is protected by and enveloped in an *electric current*; and this current renders a certain defined territory or space about such margins *thoroughly aseptic*. Micro-organisms cannot live in this current, and so such portions of the oral cavity are free from the chemical changes that result from the agency of these organisms. Have we not a very suggestive fact, taken in connection with the prevalent theory relative to the etiology of dental caries? Approximal spaces are the dangerous points. Approximal cavities, filled with gold or other metals used alone, are very liable to prove short-lived, especially if the teeth stand in close apposition. It is to these spaces that we call the attention of our patients, charging them to be especially careful and thorough in cleansing. Why? Is it not that fermentation and consequent chemical action may be avoided? If this be so, you will perceive the significance of an electric current at these points that will effectually prevent fermentation and chemical action. It would thus seem that we have hit upon the relation of these combination fillings to the fact that they require less subsequent patching than our beautiful operations with gold when used alone in such cavities. In other words, one of the generally observed phenomena, in connection with these fillings, is linked to



its antecedents. And here, also, is the explanation of or ground for the hypothesis before alluded to, that a dead pulp in a tooth so filled will not undergo that process of chemical change that results in abscess. Abscesses are held to-day to be dependent upon the activities of a certain class of micro-organisms; and this electric current is fatal to these organisms. There is too much *lightning* about the region of the pulp-canals for their safety and comfort.

But in regard to the action of this electric current about the cervical borders of cavities, rendering them less liable to be affected by a renewal of decay, there results, in addition to the *mere presence* of the current, another antiseptic element, viz., the *product* of this galvanic action. The oxidation of the tin and silver that follows aids in rendering the space about such fillings antiseptic. The influence of this product, also, upon the immediately adjacent dentine is sufficient to render it less liable to be acted upon than is the tissue surrounding a gold filling. The tissues themselves are, therefore, to an extent rendered antiseptic.

But beyond these more direct therapeutic effects resulting from galvanic action, there remains another that should not escape attention. I refer to its physiological effect.

That there should be a *stimulating of physiological function* as a result of this galvanic current, seems to be a reasonable hypothesis, and one that is based upon general physical analogy. All the tissues belong to the same body, are under subjection to the same general laws, and will exhibit analogies under similar conditions and circumstances. Electricity, in various forms, is used to-day more extensively than ever before in the treatment of abnormal conditions. It is used to stimulate physiological action. In many cases of tumors, chronic sores, atrophy, etc., it is employed with gratifying success by many of the most prominent specialists. The well-known method of treating bed-sores might be cited. A plate of pure silver, the size of the sore, is put over the affected part; this plate of silver is then connected, by means of a wire, to a piece of zinc which is allowed to rest upon a healthy part of the body. A slight galvanic current is thus established, which proves successful in the removal of these very troublesome sores. It seems reasonable to suppose, at least, that we have here an analogy with the favorable action of the combination of amalgam and gold, or tin and gold, upon diseased dental tissue. With the healing effect, or something analogous to healing in the soft tissues, and restoration of the parts to normal action, goes the restoration of the sensitive organs; and, in consequence of this, the normal feeling or sensation to heat and cold is restored.

Further than this, my observation is a good deal at fault if there is not an improvement in the density and general condition of the teeth very soon after these fillings are introduced; and I cannot regard it as at all improbable that the resultant galvanic action is the immediate antecedent of such improvement, and of an increased resisting power on the part of the tooth, which of itself is a fact of prime importance.

Now, gentlemen, if these things are true, or even approximately true, it is clear that our patients would be greatly benefited if a much larger use of a combination of metals were to be generally adopted than is the case to-day. The advantages accruing vastly outweigh any minor objections which need to follow. Of course, this kind of work, as is the case with all others, may be slovenly performed, and the teeth can be made to appear unsightly, to say the least. It is not a method that delegates to the past all skill, care, and the exercise of good judgment. When these are exercised, all objections to its use may be reduced to an insignificant degree.

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### THE RULE VERSUS THE EXCEPTION.

BY DR. G. S. DEAN, SAN FRANCISCO, CAL.

WHEN the dentist allows his mind's eye to sweep over dentures in general, and the mammalian denture in particular, he scarcely finds a case of continuous lateral contact of all the teeth. Apart from extinct creatures (such as the anoplotherium), the bimanous mammal furnishes the only instance within my present knowledge; and even here lateral contact is continuous only in the adult—there being ordinarily considerable spaces between deciduous teeth. And in this one isolated case—the adult featherless biped—unbroken lateral contact cannot be called normal or *common*. For, not only do the teeth have idiosyncrasies of position in different individuals, whence result interdental spaces; but in man, as in other mammals, they tend to segregate into groups, anterior and posterior; and the human mouth sometimes presents, with great distinctness, that peculiar theroid phenomenon, the “diastema” or space between the anterior and the posterior denture. Moreover, when the average dentist looks into the average adult mouth, he finds some teeth conspicuous by their absence, and others conspicuous by their partial presence; and he does not find that the spaces produced by extraction, filing, and breaking down have been completely closed. Or, to re-state the whole matter, interdental spaces are common or normal; they are not usually obliterated by lateral movement of the teeth.

This, then, is THE RULE.

On the other hand, it sometimes happens that spaces made by extraction, by the file, or by the breaking down of tooth-structure, are closed by lateral movement. But, in the adult mouth, complete closure is comparatively rare; the records of an extensive practice would probably furnish but few well-marked instances.

This, then, is THE EXCEPTION.

The exciting cause of these remarks is Dr. Davenport's paper which appeared in the DENTAL COSMOS for July, and which, if I understand it aright, condemns the practice of separation, because contact has been renewed in a few cases which the author of the paper reports.

The object of the present article is not to advocate separation, but merely to point out that Dr. Davenport has not told us "the whole truth,"—that he has omitted an important part of that truth. In other words, my object is to show that the question under discussion is not one which can be treated as an undivided whole; that, on the contrary, it must be divided—examined analytically. We want to be told, not that teeth always come together after being separated, for we know that they do not; but we want to be told under what circumstances they do come together,—a question which probably no one can answer with greater ability than Dr. Davenport.

It is idle to call on the separatists to abandon separation because contact is occasionally restored. I shall not refuse to ride on railroads because collisions sometimes occur. I shall not discard fire-arms because of an occasional accident, nor become a "total abstainer" because alcohol makes some men drunk, nor vote for the abolition of the sun because some men die from insolation.

I shall not abstain from the use of chloroform because it sometimes produces death. My course will be to analyze the subject—to ascertain the circumstances under which chloroform kills. When this knowledge is acquired (shall be acquired, for its acquisition is yet future), I shall use it for my guidance.

I could give a very unpleasant catalogue of the effects of vaccination. I have seen after-evils of all degrees of magnitude, from slight suppuration to utter physical wreck. But I shall not, on that account, join the anti-vaccinationists. I shall simply seek to know the circumstances under which vaccination does more good than harm; and conversely, those under which it does more harm than good.

And so with regard to separation. We have seen it advocated as universal practice, and we have seen the converse advocacy of universal contour. The every-day experience of every dentist shows that separation is not to be hastily and universally condemned.



"The able paper of Dr. Davenport proves that contour is sometimes the only correct practice. These are the "two sides of the question,"—two conflicting truths which need to be harmonized.

If Dr. Davenport will give particulars as to the age, sex, temperament, and diathesis of the terrible warnings which he has held up before us, I am sure that he will confer a benefit on the entire profession. Judging from his cuts, one would infer that his models are taken mainly from young and frail subjects; confirmatory of which inference is the fact that any dentist can send him models taken from the mature and strong, which would put an entirely different face on the subject of his paper. And I am quite convinced, from what I have seen of the dentist's denture, that Dr. Davenport's opponents in the New York Odontological Society would have forced him to take a less extreme position if, instead of expressing their "opinions," they had opened their mouths and said nothing.

At this point the mail-boy steps in, bringing the DENTAL COSMOS for August. Opening it, I find Dr. Davenport's paper has excited an unexpected amount of discussion. And I furthermore find that the Odontological Society calls for models illustrating Dr. Davenport's subject, or at least a portion of it—the effect of extraction of the first molar.

I am not a member of the society, and its private transactions are "none of my business." But what it chooses to publish for the benefit of the profession at large becomes public property, and as such concerns every member of the profession, and especially the learners like myself. I shall, therefore, not consider it impertinent to remark that the course taken by the society is a decided advance on that pursued by a majority of societies in the past, and that this advance has two parts,—namely, first, *a division of the subject*; second, *an appeal to the facts*.

But I find that Dr. Clowes does not grasp the golden opportunity to demonstrate the correctness of his teachings. This is to be regretted. The leading opponent of Dr. Davenport's doctrine ought to make a presentation. He has certainly defended his position with great eloquence; but eloquence and demonstration are two different things; a single model would be more convincing than a world of eloquence. Now, the call of his society, based on his strenuous advocacy of his practice, makes it positively incumbent on him to present his *results*,—"the whole truth," his failures as well as his successes. And his excuse is not valid. It is not absolutely necessary that he should be an expert in the manipulation of plaster; if he will simply soften a piece of wax and request the patient to bite it, that piece of wax will show all that really needs

to be shown,—the number of teeth, their relative position, and their articulation.

We learners strongly second the call of the Odontological Society. There is under discussion a question of practice which we greatly desire to have definitively answered—settled; and settled, not by magnifying “the exception,” but by demonstrating “the rule.” And we look, and consider that we have a rational right to look, to the great lights of the profession for something more than unsupported “opinions.” We want to know the bases of these “opinions,” in order to see that they are not mere vagaries of prejudice and fancy. In a word, we want just what the New York Odontological Society calls for: the genuine article—*demonstrated truth*.

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### COMBINATION METAL FILLINGS.

BY S. B. PALMER, M.D.S., SYRACUSE, N. Y.

(Read before the New York Odontological Society, October 3, 1887.)

WE very naturally shift responsibilities and throw blame, if there is any, upon others. Your vice-president is not responsible for my sayings, yet he induced me to give my conclusions respecting combined metallic fillings. In doing so, I am reminded that we live in an age of progress, and practice is constantly changing.

The following is a summary of ideas which at present govern my practice upon the principle of “survival of the fittest,” with this object in view—to save as many teeth as possible by the best materials and combinations available under the circumstances:

I desire to be brief, yet to be understood. Let us start from a definite, well-known point in practice—that gold when properly manipulated, and inserted in teeth of suitable structure, is the best filling-material yet in use. Again, let us pass by the many conditions which come up in practice, worthy though they may be,—such as inability of operators to overcome obstacles, or poverty of patients who could not pay for good work. Let every one imagine himself a first-class operator, with patients able and willing to pay for the best services which could be rendered.

Physically and chemically, there is a distinct limit to the percentage of teeth which can be preserved by gold fillings; perhaps eighty or ninety per cent. of teeth could be thus preserved. Whatever the percentage may be beyond this limit, the conditions are changed, and the gold filling becomes by law an element of destruction. Good judgment should suggest such combinations as will meet the requirements and preserve the tooth. It is unwise to argue this point and try to establish the true percentage of teeth which may be safely filled with gold. While there is a positive line from a chem-

ical stand-point, there are few if any operators who ever attain perfection; while, at the other extreme, the *best* efforts of some operators would fall far below the above-named possibilities. Thus, there is still an opportunity for improvement in operative dentistry.

In view of all this, let him who sees little need of other material than gold for filling teeth be thankful for the rare gift or skill he possesses, and have charity for the large number less favored.

This point should be kept in view—that dentine may be so poorly calcified that gold, however well manipulated, cannot prevent decay around the filling, because fluid circulation continues in the dentine; decalcification and decay are the results, most assuredly, if acids are present in food or secretions.

This is not the worst. Failure of proper adaptation, or defective manipulation, brings the normal teeth under the same law of decomposition. Thus, it may be seen that combination fillings may be a necessity to meet conditions where the ideal filling could not be produced.

Lining cavities under gold may often meet the requirements quite as effectually as to combine metals; but we will follow the text, and learn the requirements which demand compound fillings; also, the office of such combinations in arresting decay. The demand seems to call for something more than gold in cases where the dentine is not sufficiently dense to make a water-tight foundation for the filling, and to fill minute undercuts, scratches, etc., either too fine or inaccessible to be perfectly filled with gold alone. The object of this writing is to arrive at facts, without the slightest inclination to support any special material or mode of practice. This leads me to state that gold linings for cavities—that is, one or two thicknesses of No. 4 foil, backed up with tin foil—seem to answer much better than a gold filling; for this reason—the gold being thin, is pressed into inequalities much as the tin would be without it. This is an argument in favor of such operators as can manipulate gold to such perfection. Aside from this, tin possesses antiseptic properties when brought in contact with dentine of quality below normal density, though not equal to amalgam in this respect.

Some twenty-five years ago I commenced the experiments which have since been so freely discussed. At that time I was prejudiced against amalgam, and knew others to be also. Gold as a universal filling-material was on trial, yet it would not answer to use amalgam as a witness against it; therefore, I sought to establish the principle of compound fillings, by the use of tin-foil as a cavity-lining in connection with gold. Even this was a heavy load to carry at that time.

In 1878 this subject was under discussion in the State society, at



which time Dr. Kingsley announced that he was using amalgam at the cervical borders under gold, with apparent success. This was a bold stand, and, like Bunyan's pilgrim, I felt a great load taken off my shoulders.

I have endeavored to work out the problem and establish the principle with tin, rather than with amalgam, because there was less prejudice against the former. Again, there was less objection to color; but I must say, after years of observation, that so far as tooth-preservation is concerned, nothing has been gained over amalgam save the points mentioned,—prejudice and color. Indeed, notwithstanding great care in lining with tin, I have seen cases in which electro-chemical action had converted the tin into a dark paste. I do not recall any instances of decay, but such may have occurred with like conditions undiscovered. With amalgam, nothing of the kind has come under my notice. I think tin can be used in sufficient thickness to withstand such action, say one-fourth or one-third of the plug, in which case the two metals would assume positive and negative relations; the battery thus established would become polarized and the action cease. Possibly there might be a groove in the tin at the line of union with the gold.

I will not attempt to say that amalgam, if used in a layer as thin as the tin linings mentioned, would not also be converted into sulphides and oxides of the metals and be washed away, but I think not. In connection with the gold surface there is perfect union, while the surface in contact with the dentine becomes a constant antiseptic, and the sulphide of silver, instead of being washed away, enters the dentine and thus neutralizes further electro-chemical action. I think this is the first writing in which I have given amalgam preference over tin as a cavity-lining under gold. I am now speaking of the two as tooth-preserving agents. Still, there are reasons and conditions which invite the use of tin instead of amalgam, and its importance in aiding gold to preserve a class of teeth which alone it could not do is of sufficient importance to receive special attention. I can do no better than to quote from a previous paper on "Discriminate Use of Gold," published in the April, 1887, number of the *Independent Practitioner*.

"There are two distinct methods involved in the combination of gold and tin. Each will give positive results when specific conditions are observed. Any change of conditions leads to seeming contradictions. The substance of the first condition or method has been published and commented upon. It applies to filling large cavities, generally in molars, as a substitute for amalgam, the object being to form an alloy of gold and tin by chemical action upon the surface of the filling. Such fillings resemble amalgam in color and

hardness, without the disadvantage of either shrinkage or discoloration of the dentine. To obtain an alloy it is essential that the two metals be evenly distributed throughout the plug. There may be an excess of gold at any point without injury, but the tin foil must not exceed one or two thicknesses of No. 3, for the reason that the molecular action desired is limited or confined near the surface of the two metals in contact. An excess of tin greater than can be fused with the gold is chemically dissolved, leaving a corresponding furrow or pit in the filling.

"It should be borne in mind that this union or combination depends upon moisture. That is, a filling well packed in a good cavity remains the same except upon the surface. If it be upon the grinding portion, where the filling is self-cleansing, there seems to be a little difference from a first-class tin filling, but on approximal, buccal, or lingual surfaces, especially where little care is bestowed, the surface of the plug becomes hard and indestructible, which renders this preparation of great value for submarine operations. I prepare the material for this filling by placing a sheet of No. 3 tin upon a No. 4 sheet of gold. This will usually fill a cavity. If thought to be sufficient, cut through the leaves and place the gold of one half upon the tin of the other, thus giving four thicknesses, from which blocks or ribbons can be cut, the latter being rolled into cylinders. This preparation makes an excellent foundation for large gold fillings at the cervical borders of approximal cavities, where the matrix can be used, as there is no danger that the tin will be dissolved by chemical action. Cutting the foil unites the edges and secures the position of the layers while packing.

"The second method is applicable for any filling in the posterior teeth, and much better than amalgam against frail, transparent walls of bicuspid. It possesses all the advantages of a gold filling in appearance through the enamel, as well as the benefits of tin in packing and closely adapting the gold to the dentine and enamel. Many gold fillings fail because the contact is not absolute when the filling is completed. Some patients are prejudiced against amalgam who would like to compromise, if possible, between the expense of amalgam and gold. The greatest benefit to the operator consists in the saving of time. Unlike the conditions already mentioned, this method applies to teeth of normal structure, where there is no occasion for the antiseptic properties which are afforded by tin and amalgam; consequently the gold is intended to cover the tin, and, of course, the cavity would be lined with gold. The preparation of material is as follows: Cut No. 4 gold into strips from three-fourths to one inch wide; also, prepare No. 3 tin foil in the same manner. Roll the tin into a rope and untwist it, and this will leave

a pliable roll of tin. Anneal the gold, taking care not to melt it. Place the gold upon a napkin and the roll of tin upon it; bring the edges of the gold up over the tin and lap them, and the tin will be completely covered. This may be used as cohesive gold. Pellets may be made by cutting the gold into squares of about one inch, and making a loose pellet of tin; anneal the gold and inclose the tin in it. With either rope or pellet, fill as much or little of the cavity as desired. Cohesive gold may be added to finish, and when properly done the appearance is that of a first-class cohesive gold filling, and much better than the latter, as the gold is more perfectly pressed against the walls. One thing should not be overlooked when the tin has been used,—if cohesive gold is to be added, let the first piece be of one or two thicknesses of annealed gold, packed with an instrument of four well-defined points, by which the gold will receive a firm mechanical attachment to the tin foundation. If this be not done the gold covering is liable to be drawn from the tin, leaving it bare and non-cohesive.

“It is well to remove the gold from the pieces left after filling, because fresh annealing is necessary, and also because confusion might arise from allowing such foil to get mixed with that in common use. It is a pleasure to lay foundations of this combination for large fillings where there is danger of the intrusion of moisture, or when it is difficult to anchor the pellets in place. By judicious use of gold and tin, gold may be greatly helped to preserve the teeth.”

Mere combination of metals is not all that is required for comfort and durability of operations. It is quite as important that fillings of different metals are arranged according to electro-chemical principles; otherwise good intentions may be attended with evil results. For instance, a gold filling may be patched or added to in any manner with amalgam, with good results, because no current leaves the two metals while they are in absolute contact; also, an amalgam filling may be cut away and the portion in sight covered with gold equally as well; while two such metals inserted in adjacent teeth may, and indeed often do, establish an electric current through the pulp and nerve-canals, notwithstanding it is claimed that tooth-bone is a non-conductor. This arrangement of fillings at times seems quite necessary, and by a little observation of the conditions the operator may pretty clearly learn his duty. If the opposite filling to the one to be inserted appears in good order and not liable to fail,—or, in other words, if the dentine is not sensitive to thermal changes,—no trouble need be expected from that source. Preparation of the cavity for the second filling will determine the course to pursue.

If the filling is to be of gold, the cavity deep, and dentine sensitive, a filling of gutta-percha is demanded for a few months. If the



cavity is such that a gold filling could be inserted at once, under ordinary circumstances the above treatment will allow it to be done later, if there be no trouble. I would, in all cases of this kind, recommend varnishing the cavity before inserting the gold. This is a wonderful protection to sensitive dentine. If, on the other hand, the filling is to be of amalgam, the case is more simple, and may be completed at once, if it could be done, were there no opposite filling. That is, line the cavity with oxyphosphate rather thinly mixed, the same as for setting crowns; introduce a little amalgam as soon as possible, and with a round, smooth-pointed instrument burnish it against the walls of the cavity, to force out the lining material; burnish firmly at the enamel borders, so that none of the phosphate is left in sight; then fill with amalgam, and no galvanic trouble will be experienced, and a more durable amalgam filling cannot well be made. It is my practice to fill in this manner all frail teeth where amalgam is to be used. Shrinkage and decay under the filling are not known under such circumstances. This is a digression from metallic fillings. I trust you will accept the benefits and grant a pardon.

Gentlemen, the subject of operative dentistry is far from being exhausted. What I have written seems to me very common; it is every-day practice. I will read the discussions of this subject with interest and expectation to get some new ideas concerning combination fillings.

## MODE OF MOUNTING THE NEW RICHMOND TOOTH-CROWN.

BY W. STORER HOW, D.D.S., PHILADELPHIA, PA.

THE usual preliminary treatment of the natural tooth-root and the filling of the apical fourth part of the pulp-canal are predicated of all the cases which will here be described and illustrated, in exemplification of the preferred mode of mounting the new porcelain tooth-crown invented by Dr. C. M. Richmond.

A superior left central incisor root will serve as a typical case, and its projecting end is to be shaped as seen in Figs. 1 and 2. This can be rapidly done with a narrow, safe-sided, flat or square file, the angles of the slopes being such that the gum on the labial and palatal aspects will not interfere with nor be disturbed by the operator in this preliminary work, for the root-end is not at this time to be cut quite down to the gum. An Ottolengui root-reamer No. 2 is then employed to bore out the root to receive the crown-post, which is of the same size and shape as the Logan crown-post for a central incisor. Fig. 3 shows in section the relation of the reamer to the root. The new Richmond crown (Fig. 4) is then put on the root (see Fig. 5), and its position relative to the adjacent and occluding

teeth noted. If the cutting-edge of the crown is to be brought out for alignment with its neighbors, the root can be drilled a little deeper, and the reamer pressed outward as it revolves to cut the labial wall of the cavity. The palatal root-slope must then be filed

FIG. 1.

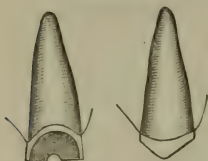


FIG. 2.

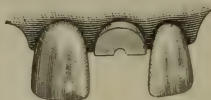


FIG. 3.



to make the V correspond to the changed inclination of the crown.

Thus, by alternate trial, and reaming, and filing, the crown may be fitted to the root and adjusted in its relations until the post has a close, solid bearing against the labial and palatal walls of the en-

FIG. 4.



FIG. 5.



FIG. 6.

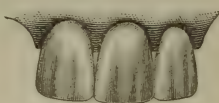
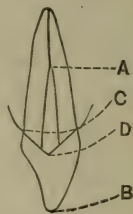


FIG. 7.



larged pulp-cavity, and the crown-slopes separated from the root-slopes by the thickness of a sheet of heavy writing-paper. This space can be accurately gauged, and the root-slopes conformed to the crown-slopes by warming the crown and putting on its slopes a

FIG. 8.



FIG. 9.



FIG. 10.



little gutta-percha, so that an impression of the root-end may be taken, and the root-slopes dressed with a file until the film of gutta-percha proves to be of equal thickness on both slopes. After thus completing the adjustment, with due attention to the alignment and

occlusion, the crown and the root are to be dried as thoroughly as possible.

To do this effectively in the root, it should first be swabbed and washed out with absolute alcohol, and then continuously flooded with warm air, until the root is not merely dry, but dried throughout as far as possible, and made so warm as to render the patient conscious of its heat. A little gutta-percha is then put on the sides of the post and over the slopes of the crown, which is then pushed into place, the exuding gutta-percha cut away, and the joint smoothed with a warm burnisher. The film of gutta-percha should be *very thin*. The crown and root may be quickly cooled by the use of the syringe with cold water, and the patient then enjoined to let the crown rest for a few hours in order that the gutta-percha may become quite set. Fig. 6 shows the completed crown.

Dr. Richmond usually takes a thin, perforated disk of gutta-percha, pushes the post through it, warms the crown, presses it into place, and when cooled removes the crown, and with a sharp knife trims away the gutta-percha close to the crown-neck. He then warms the crown, puts a very little oxyphosphate cement on the post, and presses the crown home.

The obvious advantages of the device are the readiness with which the slopes of the root-end may be shaped with a file; the facility with which these slopes may be given any angle to set the crown out or in at the base or at the cutting-edge, or to give it a twist on its axis; the certainty that, once adjusted, the final setting will exactly reproduce the adjustment; the assurance that in use the crown will not be turned on its axis,—a most common cause of the loosening of artificial crowns; the firmness of its resistance to outward thrust in the act of biting. This fact is made apparent by Fig. 7, wherein it will be seen that in an outward movement the crown B would rock upon A as a pivot, and the dotted line D shows how the crown-slope is resisted by the root-slope, which extends so far towards the incisive edge that a much firmer support is given to the crown than if the resistance should be, as it usually is, on the line of the gingival margin C.

The cases for which the new crown seems specially adapted are such as have some considerable portion of the natural crown remaining, and for these it would seem that no better artificial substitute has yet been made accessible to the profession.

For roots that have become wasted below the gum-surface the new crown is not suitable, except in such cases as are decayed under the labial or palatal gum-margin only, but have yet projecting the ap- proximal portions of the crown (see Fig. 8).

The sectional view (Fig. 9) and the perspective plan views (Fig.



10) illustrate the manner of mounting these crowns on this class of roots. The finished crown appears as in Fig. 10.

The successive steps of the process must in every instance be taken with prudence, skill, and judgment, while carefully considering every circumstance and detail as progress is being made in the operation. For example, in the fitting of the crown to the root it will require nice observation and discrimination to determine whether the crown is resting on one or both of the root-slopes or on the post-slopes in the reamed canal. Emphasis on the necessity of due attention to all the considerations connected with the adaptations and manipulations of these crowns appears all the more requisite when one observes the avidity with which thoughtless enthusiasts take hold upon a new device and off-hand declare, "That is certainly a good thing! I will try it on the next case I have." Without the slightest hesitation it is tried on the very next case (which is likely to be an unsuitable one), and the trial results in failure because of the heedless assumption that a tooth-crown or any other thing which is obviously a good thing in the precise relations for which it had been studiously designed and fitted, is therefore good for use in any other case that may present. The fault of such failure will be inconsiderately charged against the crown or its inventor by both the disheartened patient and the heedless operator.

It must therefore be clearly understood that not everything is claimed for the new Richmond tooth-crown, but some of the methods of employing it in suitable cases are here described and illustrated in order to place before the profession an additional means for meeting the constantly varying demands upon the skill and resources of its members in repairing the ravages of dental decay and loss.

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## PROCEEDINGS OF DENTAL SOCIETIES.

### NINTH INTERNATIONAL MEDICAL CONGRESS.—SECTION XVIII. DENTAL AND ORAL SURGERY.

#### FOURTH DAY—*Morning Session.*

(Continued from page 708.)

THE Section met at 11.15 A.M., September 8, the president, Dr. J. Taft, of Cincinnati, in the chair.

Dr. L. C. Ingersoll, Keokuk, Iowa, read a paper entitled "Inflammatory Processes in the Oral Tissues," in which he said he should treat of inflammation as a series of progressive changes in diseased tissue, each the result of the conditions preceding it; tracing it from its starting-point, irritation, to the total destruction of the tissues in death and decomposition. What is now known of it has been ascertained within thirty years, chiefly through the researches of

Stricker, Cohnheim, Norris, and Sanderson. The progress of inflammation depends upon the susceptibility of the tissues involved. Irritation, the first step, must not be confounded with excitation. All the organs and functions are brought into normal action by excitants or stimuli; abnormal stimulus becomes an irritant, which may be temporary, resulting in only momentary vascular excitement, or, if long continued, may cause permanent dilatation of the vessels, which marks the second stage of the process, and this may be acute or chronic inflammation. Pathologists characterize acute inflammation as a period of intense pain; but dentists often find that a tooth-pulp has passed through the inflammatory processes to suppuration and death without severe pain. This stage is characterized by slight pain, increasing in severity; slight swelling, a sense of fullness, pressure, and weight, and great uncertainty as to its result, which may be modified by the slightest cause. Chronic inflammation is more fixed. The conscious recognition of pain is one of the most cognizable symptoms of acute inflammation; in the chronic form comes a relaxation of physical pain. For example, a breath of air, contact with water, or a particle of food will excite the most excruciating pain in a freshly-exposed pulp; but after awhile the functions of the pulp gradually undergo adjustment to the new conditions, and neither of the above irritants disturbs it as before. Hypertrophy, which comes next, results from chronic inflammation, and is an excessive growth of normal tissue by normal functions in a state of chronic irritation. It may be physiological or pathological,—the former resulting from normal excitation, the latter from irritation. Tumefaction is diagnosed from hypertrophy in that the affected territory is distinctly elevated above the surrounding tissue, from which it differs in color and in texture. The most common tumors of the mouth are epuli, cysts, epithelioma proper, vascular tumors, and tumors of the dental pulp. Tumefaction of the pulp is comparatively painless, and sometimes three or four times the size of the normal pulp. In induration all the functions of the diseased part are morbid and inactive, contributing to the hardness of tissue observed. There is no limit to the continuance of any of the stages of chronic inflammation, hypertrophy, tumefaction, or induration. Should the irritation greatly increase, the process may be changed to the acute form and resolution ensue, or the acute disease may again become chronic, or pass into congestion, the alarming feature of inflammation, where the chances of resolution are well-nigh lost. It means retardation of the blood-current and accumulation of blood in the part and partial blood-stasis. Suppuration, in which is embraced pus-formation, is the last chance of life. Pus, though apparently dead, waste matter, should never be esteemed incapable

of being reorganized into tissue; it is in some sense living matter. It seemed to the writer that the views of Cohnheim and Stricker might be harmonized, and the assumption fairly made that the elements of pus may be derived from the blood by emigration, and from the surrounding connective-tissue by proliferation. Were it not for the presence of the reorganizing elements and the reconstructive energy of vitality in the midst of the destruction of tissue, suppuration would rapidly increase and speedy death supervene from the infiltration of septic poison. An alveolar abscess would then be dreaded as a death-stroke. The daily renewals of tissue keep the structure nearly intact. Gangrene is the direct result of blood-stasis. It is death of soft tissue without waste of substance. Dentists sometimes find gangrene of the gum from careless handling of arsenic for devitalization, and pulps so devitalized gangrene without loss of tissue. By the usual theory a pulp to which arsenic is applied should die at once in its entirety, which is not the fact. Necrosis or caries is death of the hard tissues of the body from inflammation. The writer excepts enamel, because in his belief it performs no vital function, but is simply a covering for the vitalized dentine beneath, and is not subject to inflammatory processes. When in the last stages of congestion inflammatory stasis supervenes, so that the nutrition of the bone is suddenly cut off, necrosis is the inevitable result. Suppuration may be communicated from the soft tissue of the gum to the periosteum of the alveolar processes, and this hard tissue be wasted away by ulceration. This is true caries of bone, but, on account of the extreme thinness of the structure and its compact nature, it is not so good an illustration as when the maxillary bone is involved. Here granular tissue may form over the wasting surface, the true tissue of reconstruction. Inflammation of the cementum, which is modified bone, is similar to that in true bone; but owing to its vital relations to the tooth-pulp it is endowed with a higher sensibility when inflamed, though normally not peculiarly sensitive.

All sensation in the dentine is attributable to the living animal tissue, which in the form of minute fibrils proceeds out from the pulp, forming a plexus on the periphery, none of which is normally peculiarly sensitive; but as soon as inflammation begins it manifests its high degree of sensibility to pain. A further evidence is the fact that a metal filling in a small cavity, every part of which is two lines distant from the chamber, will cause inflammation of the pulp. The pulp should be called the dental ganglion, for from it as a center radiate innumerable nerve-fibrils, promoting life and nutrition in all the surrounding hard tissue of the dentine. The process of inflammation in dentine can be best understood by reference to the analo-



gous process of bone. When dentine presents a brown or black decay it is necrosed, but demineralized dentine is in many cases far from it. Inflammation must be given credit as an active factor in dental decay, in addition to chemical decomposition and micro-organisms.

Dr. A. O. Rawls, Lexington, Ky., in opening the discussion, was not aware that he could add to or gainsay the statements contained in the paper. It is a well-known fact that all this which has been recited of the inflammatory process has been stated by Cohnheim and others whose opinions on pus-formation are generally accepted, that it is by transference through the walls of the vessels of the leucocytes. The only difference between Cohnheim and Dr. Ingersoll is that the latter believes that in inflammation not only are the leucocytes passed through the walls of the blood-vessels, and increased in numbers, but new tissue is formed which takes part in this process. He does not believe that Cohnheim intended such an interpretation, or that Dr. Ingersoll can substantiate his position. His own idea is that pus is composed of leucocytes and the broken-down débris of tissue; no embryonic elements enter into it unless they are first broken down. It is true that according to Stricker and Cohnheim there seems to be a return to embryonic life, because in the early formation more leucocytes are found than in the complete tissue. The paper should be valuable to dentists for the reason that as a rule they did not sufficiently understand the processes of inflammation. With a better knowledge of these they would be better able to treat inflamed pulps. Dr. Ingersoll claims that hypertrophy of the pulp is in the nature of a tumor, with which idea he disagreed. He apprehended that it was more in the nature of a strangulation of the tissues of the nerves, and was more properly a fungous growth. A tumor was more regular in its formation, while the hypertrophy was conglomerate. He thought Dr. Ingersoll was wrong as to inflammation in the dentine. He must mean that there is inflammation in the pulp to produce it, and that sensitive dentine does not arise from inflammation of the pulp. Dr. Ingersoll says that arsenious acid does not always destroy the entire pulp. The speaker's idea of this was that strangulation takes place only where the closing of the canals permitted it. Contact of the instrument with dead nerve-tissue would lead many to believe that the pulp was still alive. Dr. Ingersoll says that pus may be considered a living tissue. The speaker could not see how this could be true in any sense. It was alive as to chemical action; it was alive as to its affinities; but it had no connection with any living organism. The leucocytes may be considered as living wandering cells, but when they passed out of the vessels they were no longer living; they had lost their place in the part that once owned

them. Again, Dr. Ingersoll speaks of the granulation of living tissue over carious surfaces. The speaker could not conceive of such action. Granulations must form over living tissue. Sensitive dentine, he apprehended, arose from a hyperemic condition of the fluids contained in the dentine. It was true it was similar to and might be caused by inflammation, not in the substance itself, but by the production of pressure on the pulp, whence the hyperemia was communicated to the fluids in the canaliculi. When a healthy tooth was freshly broken and the pulp exposed, there was no sensitiveness to the touch. Demineralized dentine was caused by one of the forms of inflammation in the pulp, as compression, which melted away the lime-salts the same as a soft tissue under similar circumstances.

Dr. M. H. Fletcher, Cincinnati, treated inflammation (periostitis) with electricity. An experiment which he had tried by isolating the mesentery of a frog and applying electrical currents seemed to show that the life of the white-blood corpuscles was such that it was directly affected by electricity.

Dr. John C. Storey, Dallas, Texas, understood Dr. Ingersoll's paper to state that in inflammation there was an increased flow of blood to the part. If this were true, all his (the speaker's) teachings were at fault. His idea was that in inflammation there was a damming up of the blood, so that it could go no further. He had also been taught that pus as pus never could enter the circulation directly.

Dr. Ingersoll said that the diagram explained not only the progress but the retrogression of inflammation. From this it would be seen that hypertrophy, tumefaction, and induration can be reduced by irritation. Stricker represents the formation of the capillary as similar to the boring of a tube through the mass of the tissues. The leucocytes may pass out at any point. The drawing of the pulp (which pictured it as he believed it to exist) showed how easy it was to produce inflamed dentine, by merely irritating some of the terminal fibrils of the pulp-tissue.

Dr. M. L. Rhein, New York, thought that a pathological point made by Dr. Rawls in antagonizing one of Dr. Ingersoll's points regarding the formation of living tissue over a dead surface was erroneous. It was just in this way that encystment occurred. It did not come from the dead surface, but it got all around it. He thought that Dr. Rawls was right as to the hypertrophy of the pulp.

Dr. Ingersoll replied that if Cohnheim's teaching was accepted it would never be called hypertrophy.

Dr. C. L. Goddard, San Francisco, read a paper entitled "Pain in the Temporo-Maxillary Joint," caused by defective articulation. In the case reported only the incisors occluded, when the jaws closed normally. In order to masticate his food the patient protruded

the lower maxilla so that the inferior incisors could lap over the superior, when the bicuspid and molars would articulate, and the pain ensued when he used his jaws in that position. To correct the mal-occlusion it was determined to move the superior incisors forward. This was accomplished by means of a Coffin plate split transversely, with wires upon both sides of the mouth. The teeth moved as rapidly as could be expected in a patient of thirty years, and the change was completed in a few weeks. The posterior teeth antagonized well in the new position, except one inferior molar, which was too short and had to be elongated with gold. The right superior cuspid had to be moved further out than the other teeth. This was accomplished with another modification of the Coffin split-plate, but instead of splitting the plate in the middle a small piece the shape of a new moon was cut out opposite the position of the cuspid, into which one end of the wire was inserted, and a platinum band was placed around the tooth to prevent the impinging piece of the plate from sliding off. An atmospheric-pressure retaining-plate was inserted, and the pain gradually disappeared.

A paper by Dr. E. S. Chisholm, Tuscaloosa, Ala., on the "Influence of Weather Changes on the Human Organism," was read by title.

Dr. Chisholm briefly outlined the idea of the paper, by referring to the fact that most dentists had observed variations in the sensitiveness, and apparently unaccountable diversity of results from similar treatment, of the same patient's teeth at different times. Many years' study of these phenomena had convinced him that much of this was owing to weather influences, and he suggested that others should see if observation would not confirm his views.

Adjourned.

#### *Afternoon Session.*

The Section was called to order at 3.10 P.M., Vice-President W. W. Allport, Chicago, in the chair.

Dr. E. S. Talbot, Chicago, read a paper entitled "Etiology of Irregularities of the Jaws and Teeth."

The paper premised that irregularities are more frequent among civilized races to-day than among the ancients. While the superior maxilla is often proportionately less than the inferior, it is rare to find the latter not fully developed. The writer believed that arrested development of the superior maxilla was due to insufficient nutritional supply because of the inaction of the jaw. Narrow and contracted jaws were more numerous now than in former races, owing to differences in food-preparation, giving the jaws less exercise. The teeth developed independent of the alveolar process, but the processes were dependent upon the teeth for their development,



position, and shape. If the teeth erupted upon the inner or outer border of the process the diameter of the arch would be proportionately smaller or greater than that of the jaw-bone. The eruptive fevers among children may cause arrested development of the maxillary bones. Arrested development was characteristic of idiotic, imbecile, and feeble-minded children. Referring to published statistics on this point, the writer detailed the results of a large number of examinations of children in institutions for the feeble-minded, which he had personally made, or which had been made at his request. The total number of examinations made was 1,605. Of these 924 had normal jaws; 87 large jaw; 63 protrusion of lower jaw; 97 protrusion of upper jaw; 238 high arch; 101 V-shaped arch; 200 partial V-shaped arch; 159 saddle-shaped arch; 56 small teeth; 31 presented the thumb-sucking type. It must be conceded that in an equal number of strong and feeble-minded persons the larger percentage of deformities was found in the latter class. The V-shaped arch was always associated with the superior maxilla; never with the inferior nor with the first teeth. The hard palate may be either low or vaulted. The jaws always changed after the eruption of the first permanent molars and incisors. This deformity was sometimes caused by too early extraction of the temporary molars and cuspids. The saddle-shaped jaw was usually found in the superior maxilla, though sometimes in the inferior. The primary cause was the location of the crowns of the permanent teeth in a dwarfed alveolar process. It was always associated with a high-vaulted arch. Concerning the influence of heredity on irregularities, the paper continued: Morbid conditions and peculiarities of structure were often transmitted, varied according to the environment. This law was a powerful factor in the production of deformities of the jaw and irregularities of the teeth; not only in general irregularities, but also in malformations of particular teeth. Very often we are unable to determine the precise degree of influence exerted by heredity, even when convinced that it is a powerful factor. As the teeth develop independently of the alveolar process, their order of development and the resistance imparted by other teeth and roots combined to produce irregularities. In short, local causes produced a majority of deformities and modified formations which might otherwise be the exact counterpart of the teeth of the parent. The interesting circumstance that irregularities are more frequent now than formerly, and more common among people living in new countries, would suggest the idea that irregularities caused by heredity may result from the intermarriage of different nationalities. It was probable that the varying character of food and the abuse of the teeth incident to the depraved hygiene common to modern

civilization had much to do with dental malformation. Again, the higher the evolutionary type of individuals the more imperfect the teeth and jaw-bones. Dr. Talbot presented a number of cases in support of his views with excellent illustrations of the types shown.

Dr. N. S. Davis, president of the Congress, was introduced by Dr. Taft, who, in presenting him to the Section, characterized him as the man to whom more than to anyone else the success of the Congress was due; and, moreover, as one whom dentists should be glad to know, as to him was due the honor of introducing the resolution in the American Medical Association which admitted dentists to membership in that association on equal terms with medical men.

President Davis was received with hearty applause. When quiet was restored, he said there should be no different purpose in dentistry than in other branches of medicine. The aim of each should be to place all on one harmonious plane. The day for sectional differences had passed. Medicine worthy of the name was founded on a broad basis. In 1865, at a gathering of medical men at his house, he had taken the ground that the teeth were as important as any other part of the organism, and he had predicted that dentistry would come to be a recognized specialty of medicine. At the last meeting of the American Medical Association he felt that the time had come when the dental department of medicine should no longer stand as a separate profession; when an official declaration should place them on the same plane as the other specialties, and he had accordingly introduced the resolution of which his auditors knew. Adverting briefly to the so-called "pathies" which had arisen, he expressed the hope that the last vestige of these pretended "schools of medicine" would be swept away, and that no man should be recognized who was not willing to come upon the broad platform of a doctor of medicine.

Dr. E. H. Angle, Minneapolis, read a paper entitled "Notes on Orthodontia, with a New System of Regulation and Retention."

Dr. Angle was gratified to note the many improvements in the methods and means for the management of irregularities, but he felt that there was still much to be done. He should confine his paper to a consideration of the movement of the teeth in regulating, and appliances for retaining them in position. There were five principal movements practiced in regulating teeth, as follows: Forward in line, backward in line, from within outward, from without inward, and rotation; and rarely elongation or depression. Only one movement should be attempted at a time by means of mechanism; otherwise the irritation set up might be too great. In his opinion, it mattered little whether the movement was continuous or intermittent. The work being completely under the operator's control, the

movement might be fast or slow, as his judgment dictated. Of all the appliances that have been brought forward for regulating, perhaps the most useful was the jack-screw; and next in merit was piano-wire. Taking an unnecessary length of time to complete the operation was often the cause of failure, as both the operator and the patient became exhausted. When pressure was once applied, it should be continued to the end. Frequent stoppages would cause soreness, and indeed failure, as also strangulation, so often attributed to too rapid movement. The force should be so applied as to overcome the resistance of the tooth, but the appliance should not rest upon the gum. Covering the crowns of molars and bicuspid in regulating the anterior teeth was unnecessary, and was to be deprecated. After a mal-placed tooth was moved to its proper position, it should be perfectly supported and retained until it became firm in its socket. It should be held so steadily that there could be no interference with the new bone-formation about the root, by the slightest movement. Absolute rest of the parts was necessary during the formation of the new socket, as alveolar tissue formed under unfavorable circumstances would not be normal in structure or durability. The retaining apparatus should, therefore, remain in place until the object sought was accomplished.

Any dentist could construct the appliances which the writer had devised, and carry forward successfully the work of regulating. If properly done, the work would be almost painless. Before entering upon a description of the appliances, he thought it well to state that he believed it was a valuable practice to cement a thin gold or platinum band about the teeth to be moved, a device which he believed should be credited to Dr. W. E. Magill, of Erie, Pa. The plan he had found most satisfactory was to take a strip of No. 32 to 36 standard-gauge platinum plate, one-eighth of an inch wide, make it into a loop, and slip it over the tooth. It was then drawn tightly about the tooth with flat-nosed pliers, burnished to conform to the shape more closely, soldered, and the ends clipped off, when it was complete, and ready to be cemented on. The jack-screws which he used were made by cutting a thread on a piece of Stubs's steel wire, of the proper length, one end of which was beaten flat, and the other provided with a nut of platinum-gold. Then he took a piece of what was known among jewelers as joint-wire, with both ends left square, or with one end plugged, and turned to a point, forming a pipe, into which the screw was slipped. The traction screw was usually about three-eighths of an inch in length, of Stubs's steel wire, with one end bent at a right angle, and otherwise made similar to the jack-screw. The rotating appliance was a piece of piano-wire bent at one end to form an eye. A tooth which



was to be twisted was banded as described; a piece of joint-wire, say one-fourth inch in length, was soldered to the band, which was then slipped over the tooth and cemented to it, and the force applied by means of the rotation appliance, the straight end of which was inserted in the joint-wire, and the other end to a molar by means of wire ligatures. When the tooth was got to its proper position, it was held there by putting a short piece of jewelers' plated wire through the joint-wire pipe, the plated wire being long enough for the ends to rest upon the labial or buccal surfaces, as the case might be, of the teeth on either side of the one which had been regulated.

Dr. Angle then proceeded to detail different applications of his method. In making the appliances extreme care to insure accuracy was demanded. The little gold pipes should fit snugly the appliances passed through them. In reply to questions, he stated that the posterior teeth could be prevented from moving forward, when regulating a cuspid, by anchoring several teeth together in such manner as to divide the strain; and that, in young patients, six months was usually long enough to use retaining appliances when a good occlusion was secured.

Dr. J. N. Farrar, New York, remarked, in opening the discussion, that the subject presented in the two papers which had been read was a large one. While some of the points made in Dr. Talbot's paper did not seem to him correct, it contained many common-sense statements and deductions. The best part of it was its record of observations as to the state of the teeth and jaws among idiots. It mattered not whether the final conclusion was positive or negative, science would be advanced by such work. He had himself spent considerable time of late going over the same field, and he felt dissatisfied with the advance made. Many of the observations which have been recorded were incomplete. It was not enough to examine the mouth of the patient. To make the examination valuable one should know the parentage for at least two generations back. He was inclined to think that much of our knowledge on this subject would be evolutionary. One thing that had been pretty fairly settled was that there was more irregularity of the teeth along the border-line between nations affording differing types, than in the interior where there was less likelihood of admixture. Again, some knowledge would come from a study of what was called "breeding." In regard to insanity, as bearing on irregularities of the jaws and teeth, most people thought that there was a correspondence between the protruding upper jaw and the intelligence of the individual, where there was a sloping forehead. Such a conformation was always accompanied by peculiarity of the mind; if not weak,

it was odd. In idiocy a different aspect of the whole question was presented. The blending of insanity and idiocy was so little understood that they could hardly be classed together. There was room right here for a great deal of work, and he was much pleased with the investigations which Dr. Talbot had chronicled. What was wanted in this field was more facts. When a world of facts had been collected, a definite, correct conclusion could be reached. Observations made in Europe and this country showed marked discrepancies, the cause of which was probably some carelessness on the part of the observers, or some difference in the manner of looking at what was seen. It might be that a different percentage would be found one year from another. He hoped that observers would not be discouraged, but that they would go on in the good work of discovering the cause and relations of irregularities.

With regard to the other paper, he (Dr. Farrar) felt a delicacy in speaking, as perhaps some of those present might appreciate. The principles involved in regulating might be included in two generic modes, known as he named them as the probable and positive, the former implying the use of elastic materials for traction, and the latter the application of a positive mechanical principle. The former he thought difficult to harmonize with physiological functions to attain the highest possibilities with the least pain, especially in adults. In the positive method the force acted intermittently, and was under the absolute control of the dentist, who was thus enabled to keep the movement within the domain of physiological action and render the operation painless. These facts naturally suggested that, as a rule, in adult jaws teeth should be moved by the positive plan. There were cases, owing to the shape and location of the crowns of the teeth, when this was impossible. In the mouths of patients under ten years of age the least assistance would move the teeth into place. The speaker claimed that the character of the force would govern the question of pain; that the functions of the tissues would tolerate a proper degree of intermittent force, and that any cleanly mechanical apparatus that could be absolutely controlled belonged to the positive method, which he considered the most scientific. Regulating apparatus constructed as the essayist has described was in the main in accordance with his own views, but when it was put forth as a new system the author was assuming what could not be accepted by readers of the dental journals.

Dr. L. P. Haskell, Chicago, had attended a meeting of the Minnesota State Dental Society, last July, at which Dr. Angle had read a paper and presented his apparatus. The fact was that the pictures shown here did not give a correct idea of the appliances. Dr. Angle, he believed, had several sets of them with him, which would be

passed around for inspection. These appliances were so few and simple, so small and delicate, and withal so effective,—especially as they dispensed with rubber plates,—that he wished every dentist could at least see them. In connection with the subject of abnormal irregularities, some others which occurred so frequently that they might be called normal should be considered. In ninety-five cases out of one hundred there was more depression on the left side of the jaw than on the right, so that in supplying artificial dentures more material was required on the left, and really longer teeth; and the lower jaw was rarely symmetrical, the left side being often thrown out of the perfect line of the arch. He could only conceive of one reason for this, and that was that most people, being right-handed, bit off their food and then masticated it on the right side, and there was consequently constant development of the muscles on that side.

Dr. J. L. Gish, Jackson, Mich., showed models and gave the history of a case of irregularity he had had under treatment. After the teeth had been moved to their proper positions a retaining-plate was fitted and allowed to remain three months. On removing it the central incisors returned to their previous position in one week. They were restored to their proper places and held in position for four months, when on removing the retaining-plate they immediately relapsed into their former condition. They were again regulated, and this time were held with a retaining fixture for over a year, when he found that no ground had been gained. In a few hours all the work that had been done was undone. All the other teeth appeared to be solid in their new places except the central incisors.

Dr. W. N. Morrison, St. Louis, Mo., had laid a claim to the use of thin bands cemented to the teeth several years ago, and had shown his method at the meeting of the American Dental Association in 1885. He would demonstrate it on Saturday at a clinic in the Franklin School Building.

Dr. W. C. Barrett thought the discussion was assuming a phase foreign to the aim of the Section, which, as he understood it, was not the place for the recital of cases, or the settlement of claims of priority. To his own apprehension, one force which had its part in the production of irregularities had not been alluded to in Dr. Talbot's paper, and that was the simple matter of occlusion. He thought he had traced the origin of the saddle-shaped jaw in some cases to faulty occlusion of the teeth, and he believed mal-occlusion was a potent cause of mal-formed jaws and mal-placed teeth. The essayist made the assertion that the closer we get to the primeval type the better the type would be. Some years since the speaker had presented to the American Dental Association a paper giving the



results of a study of some four thousand skulls, from which he had reached the conclusion that there had been no special change in the type of the teeth, and none in the type of the jaws; nor was there any special difference in the eruption or in the frequency or location of caries. There were skulls of the Indians dating from a time previous to the advent of the whites. Another observation made at the same time was that there was no evidence of syphilitic lesions in these skulls previous to contact with the white race. He did not believe that as far back as the history of teeth went there had been any material change in the type of the teeth or of the jaw, nor in the types of development, eruption, or diseases of the teeth. Different types of teeth and jaws presented national characteristics, connected with national peculiarities, and the further back we went the better the teeth, and the better the development, aside from the troubles connected with the intermingling of races.

Dr. I. A. Salmon, Boston, thought that Dr. Talbot had failed to note one thing which had been found necessary in correcting irregularities,—*i. e.*, to bring the tooth which was moved a little beyond the position it was to retain. For instance, even after a tooth which has been brought outward has been retained in its new position for a year, it might fall back slightly when the retaining fixture was removed, and it was therefore necessary to make allowance for this movement.

Dr. C. M. Bailey, Minneapolis, had been interested in the remarks of Dr. Farrar. If we should admit that there could be only two systems of regulating, there would now be no possibility of a new system. But he thought that a method which absolutely got rid of plates, and permitted perfect cleanliness, and insisted that tension should not be dispensed with until the tooth which had been moved was thoroughly fixed in its new position, had decided merits, and to describe it the term "new system" was perfectly applicable. It was true that many of the fixtures used had been described, or nearly described, in the dental journals, but the jack-screw which Dr. Angle used was at least fifty per cent. smaller than the smallest on the market.

Dr. E. Parmly Brown, Flushing, L. I., felt that, inasmuch as Dr. Angle had called his method a "new system," he must be emphatic in protesting against that designation going out as the sense of this Section. He had, with the assistance of Dr. W. W. Evans, of Washington, found twelve cuts in the DENTAL COSMOS which almost exactly depicted the appliances shown by Dr. Angle, and he wished them to go out with the report as rebuttal evidence.

Dr. Angle wished to know what they were and where they were to be found.

Dr. Farrar thought it was not necessary to discuss the matter here.

Dr. V. H. Jackson, New York, said that the band with spring might be found in the "American System of Dentistry."

Dr. Angle thought the gentleman entirely misapprehended the point. Dr. Guilford banded the tooth and soldered the spring to the band, necessitating the construction of a new appliance for the retention of the tooth when in position, which was the nearest approach to the principle he used—the pipe.

Dr. Talbot had seen the same appliance in Dr. Farrar's office.

Dr. Angle [referring to the illustrations pointed out by Dr. Brown] maintained that the drawings were entirely different from his appliance. Dr. Farrar bands the tooth, but he failed to see that the band with the joint-wire had ever been used in dentistry. It would take hours to manufacture Dr. Farrar's appliance; his own could be made in from ten to fifteen minutes. He did not claim originality in the screw. He had merely simplified its construction, and made another application of it, and, as he described it, it could be readily constructed by any dentist. One of his principal claims was the carrying of the piping and banding all through the different phases of regulating.

Dr. John C. Storey, Dallas, Texas, would like to know if the object of this gathering was to establish the principles which should govern dental practice or to settle conflicting claims as to who first made this or the other appliance. He thought it would have been better if the claimants had said, "Gentlemen, if I got it first, it is all the same free to you."

Discussion closed.

Adjourned.

(To be Continued).

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## AMERICAN DENTAL ASSOCIATION.

### SECOND DAY—*Evening Session.*

(Continued from page 714.)

THE Association met at 8.15 P.M., Wednesday, August 3, President Allport in the chair.

Section V, *Materia Medica and Therapeutics*, was called, and reported one paper on "Immediate Root-Filling," by the chairman, Dr. A. W. Harlan, Chicago.

Dr. Harlan read his paper, in which, commenting on the spread of knowledge concerning therapeutic agents, he indicated the basis of modern dental practice to be a better understanding of the causes of pathological conditions, which was as gratifying to the students

of pathology and bacteriology as was the report in former years of a new method of pivoting teeth or capping a pulp to the old-time practical dentist.

In the therapeutics of root-treatment very decided progress was to be noted, and there was now little uncertainty with reference to the outcome of cases formerly doubtful. The old empirical methods were being discarded for the new and scientific. Roots of teeth were not now packed with medicated cotton or silk for months before being filled, and it was now well understood that daily changes of dressings were harmful, in that they retarded the healing of abscesses beyond the apices. Some practitioners advocated the immediate filling of roots, no matter what the conditions in the canals or the territory beyond them. He assumed that it was safe to fill immediately all roots from which the pulps have been removed after destruction by arsenic or surgical means; also, all those in which abscess with a fistulous outlet existed; but excluding those where pus or other fluid exudates were drained through the root-canals. It might be that no danger would arise from the sudden stopping of a root the end of which was encysted, or even where the canal was perfectly dry on being opened into, if complete disinfection were practiced; but it was questionable whether it would be safe practice to permanently fill a root at the first sitting when moisture or pus was found to ooze into the canal. If all roots were approximately straight, or if all teeth possessed single or even double roots, and were located in the upper maxilla, so that drainage could certainly be secured in all cases, it might be possible to safely treat and fill at once, if the general health of the individual was such as to warrant the risk. But this was not the case. Many operators who rode the hobby of immediate root-filling were not provided with the delicate instruments necessary for removing fragments of the pulp and all septic matters; nor did they take the precaution of bathing the tooth and rubber dam with a proper disinfectant, but frequently used disinfectants which were powerful coagulators of albumen. It was impossible for the degree of success claimed to follow such operations. Sufficient time must be allowed after the application of the disinfectant to insure the complete decomposition of mephitic gases and the destruction of microbes and their spores. The constitutional condition of the patient and the conditions immediately surrounding the tooth must be favorable, or there would be no certainty of success. Some operators used as a disinfectant ninety-five per cent. carbolic acid; others peroxide of hydrogen, iodoform, 1-1000 solution of bichloride of mercury, etc. There was still greater diversity in the materials employed for filling,—orange-wood, cedar sticks, oxyphosphate and oxychloride of zinc, gold wire, gutta-percha,



lead, tin, cotton, and silk having all been used by immediate root-fillers. Time enough had not elapsed to show the utter worthlessness of wooden sticks as a root-filling. No matter how powerful the disinfectant, no reliance could be placed on the soaking of wooden points in it to prevent future trouble. Non-coagulators of albumen, or those having feeble coagulant power, were indicated every time for the disinfection of root-canals or sacs. Peroxide of hydrogen, solutions of bichloride of mercury; essential oils; iodine, bromine, or chlorine water; aqueous solutions of aluminum, potassium, or other salts of metals, were to be given the preference in all cases. The crystalline bodies obtained as by-products in the distillation of coal-tar, which were sparingly soluble in water, were also to be commended. A root-filling must be non-irritant, and not dependent on its acquired antiseptic power; must be easy of introduction, and not acted upon by acids, alkalies, or ferments, but impervious to moisture. The danger of after-troubles from immediate root-filling was always imminent where drainage was not made possible by previous treatment. There was no necessity for such celerity in the filling of roots; a little time, with temporary dressings in the canals, was always well spent. No one could foretell the possible disastrous consequences of a too sudden closing of the apex of a pulpless tooth. The writer had no dread of being thought too conservative, and this word of warning was not to impede progress, but to point out some of the dangers in the path of the immediate root-filler.

Dr. W. C. Barrett, Buffalo, had not practiced immediate root-filling, but he could readily conceive of circumstances where the immediate filling of pulpless teeth would be the best practice. If the root was properly cleansed and rendered aseptic, he could see no objection to the practice. He was satisfied of the real existence of the danger of over-treatment. The later observations in regard to the treatment of root-canals have materially altered the practice in these cases. Some have contended that the filling should be antiseptic. He had never subscribed to that doctrine. He wanted his root-filling to be as nearly neutral as possible, and to approach as nearly as might be the natural condition of the tooth. It should be a plastic, so as to be easy of insertion in a tortuous canal. He expected to secure a healthy condition before filling, and he wanted the filling simply to maintain that condition.

Dr. M. L. Rhein, New York, thought dentists would all come to practice immediate root-filling more extensively than now, and that a consideration of true surgical principles would prove the correctness of the practice. With the improved drills now at command there was no difficulty in going to the apex of any root. The objection might be made that it was not proper to enlarge the canals; that to

cut away the interior of the tooth was bad doctrine. He believed that a better aseptic condition could be secured by burring out the inside of the canal all the way up. When the canal has been in a putrid condition the septic matter could be got rid of in this way sooner than by medication. After this was done, he would use for an antiseptic something that would not coagulate,—bichloride of mercury, or what was still better, the potassic iodide of mercury; then immediate filling would leave the tooth in as good condition as though it had been seen a dozen times. If after-trouble did occur there was only one course to pursue: enter through the alveolar process, in which case the treatment would be easier than through the interior of the tooth.

Dr. Louis Ottofy, Chicago, while agreeing with the reader of the paper in most points, did practice immediate root-filling, exercising due care in the selection of cases, and he knew many others who were following the same course. Two years ago, when this subject was up before the Illinois State Society, Dr. Harlan had presented a paper the discussion of which he (Dr. Ottofy) had opened. At that time he had had about seventy-five cases of immediate root-filling, some of which were failures. Now he could tell almost to a certainty what cases were going to be successful and what not. Dr. Harlan did not say that in his own practice he filled immediately sixty per cent. of the roots of pulpless teeth he treated, which was perhaps the general practice. Except where alveolar abscess existed, the root might be filled immediately, if thoroughly clean and aseptic. Many cases which were formerly treated four or five times could now be filled after two or three treatments; and those which used to be treated once or twice could now be filled at once. It was his practice to fill immediately seventy-five per cent. of the pulpless teeth coming under his care. He did not try to fill immediately canals which he could not explore perfectly; hence third molars were not generally included among those filled at once. As to the patient, he wanted a robust, healthy-looking person. As a disinfectant he used bichloride of mercury, 1 to 1000, for pumping through the root, and 1 to 500 in the root. Then he applied eucalyptol and iodoform, and while the root was full of this he introduced the regular gutta-percha filling.

Dr. W. H. Atkinson, New York, admired the nominations of the paper, but he doubted its value, on account of its lack of clearness. There was not one point of true therapy clearly brought out in the paper. The metabolic system must be out of order to permit an abscess in the human frame. Who has penetrated the subject deep enough to know whether a case is aseptic or not? If you knew that the micrococcus was the antecedent of the retrogressive move-

ment, and knew also what would kill the micrococcus, that was very well. Where there was no pericementitis or periostitis upon a root, it might be cleaned out and filled at once. Where the end of the root was encysted no antiseptic was needed. Dr. Barrett was right when he said he wanted only to exclude foreign matters from the canals of a healthy tooth. Any impermeable substance which had all its affinity for oxygen satisfied would be a complete filling for such a root. Dr. Harlan asserted dogmatically that anything that coagulated albumen was not fit to be used in the treatment of a pulp. Where a tissue was broken, before repair, coagulation of albumen was exactly what was set up. Chloride of zinc has repeatedly been introduced into canals to save the pulp, and has converted them into a hyaline body that has been a perfect filling, without any change in the color of the tooth. Dr. Harlan would use bichloride of mercury, but not chromic acid. The difference between the two was just a difference of attenuation. A solution of one in four hundred of chromic acid would have nearly the same effect as one to one thousand of bichloride of mercury, and both were coagulants. Both cooked or vulcanized albumen, rendering it inert and non-putrescent.

Dr. C. N. Peirce, Philadelphia, wondered if we realized how tolerant nature was of our blunders. For thirty years carbolic acid had been used by dentists almost exclusively as a dressing for root-canals, and he was inclined to think that quite as many cases had been successful under it as under any other treatment. If the pulp was dead and the root thoroughly cleansed, when the apex was closed he did not care for an antiseptic cleansing of the interior. Such a root was safe except for changes in systemic conditions. If he had a tooth in which the pulp had been dead for years, without abscess, he wanted to be sure that there was no accumulation that he was closing in and that must find an exit some way. If he had a tooth with abscess already established and discharging through a fistulous opening, he would fill at once. The sooner such a tooth was filled after the root was cleansed and purified the better, and then if the abscess was not cured in twenty-four to forty-eight hours, it could be treated externally. But in all these cases the systemic condition of the patient must be considered, and this might modify the treatment. He used chloride of zinc frequently, generally in cases where abscesses were established, and with satisfactory results.

Dr. Rhein. When the pulp has been dead some time, and the canals can be cleansed thoroughly at one sitting, what advantage would there be in delaying the filling?

Dr. Peirce. If the tooth was in the lower jaw, gravity would assist in carrying the medicine to the territory around the root; if



in the upper jaw, a little pumping would do it. When the exudation was stopped the tooth could be filled. He would like to ask Dr. Harlan what he meant by drainage. If it was simply to give exit to the accumulation resulting from inflammation, without any effort to check it, that was the practice of fifty years ago.

Dr. Harlan. Drainage should be afforded by opening into the alveolar process opposite the end of the root, after its immediate filling, where moisture or pus was found on opening into it, and where there was no fistulous outlet.

Dr. Peirce. That would be simply establishing an artificial abscess, which in Philadelphia was not considered good practice.

Dr. S. H. Guilford, Philadelphia, agreed with the ideas of the paper so far as he understood it. There were two or three things to deal with in the treatment of dead or devitalized teeth besides the pathological condition. First, it was necessary to get into the interior of the root, cleanse it, and treat it, and then fill it. In opening up a canal it should be so done that every part could be got at, and then all the débris should be removed. When a drill is passed into a canal, either to enlarge it or to remove a portion of the dentine which has got into a bad condition, it required to be done with great caution. The drilling of a root under most circumstances was a dangerous procedure. Very often bad results followed it, as the breaking of the drill, in which case it was difficult to get it out, or the perforation of the side of the tooth. No one could say whether the roots were straight or not, except in the anterior teeth. The way to avoid the difficulties mentioned was not to drill the canals. Why should the drill be resorted to? Was it to enlarge the canal? He thought drilling was unnecessary, and should not be done except under stress of circumstances. In regard to the filling of roots, some advocated immediate filling, others slower work. To him it seemed better to adopt the safe course. If, after restoring the health of the parts, we were justified in filling immediately, it would be just as safe to wait a little while to be sure. He saw no necessity for filling immediately. He would introduce a dressing that would keep the air out, and wait a few days before putting in a permanent filling. Suppose the root was filled at once, and trouble occurred as a result, there would then be a serious complication, and it was better to wait long enough to test whether all was right. He thought that in the great majority of cases, by adopting this course, there would be no trouble. He believed in being sure in advance, and then filling the roots with the expectation that they would never have to be opened again. As to the filling-material, anything that was neutral and not irritating to the tissues, and that would not undergo change, would serve the purpose. There were many materials of

that kind, but probably the majority of practitioners used oxychloride of zinc or gutta-percha. Before filling the canal, he believed in stopping the apical foramen perfectly, say with a bit of cotton, so as not to permit anything to go beyond it. The root should be stopped perfectly, so as not to cause irritation to the parts beyond its end. In all these cases extremes should be avoided and the safe middle ground taken.

Dr. S. C. G. Watkins, Mont Clair, N. J., wished to know why Dr. Guilford used cotton at the apical foramen, and why he would not use gutta-percha instead.

Dr. Guilford replied that he used merely a fine shred of cotton that could be carried up with a broach. It was touched slightly with carbolic acid or iodoform before being inserted. Gutta-percha was just as good.

Dr. Watkins. How would Dr. Guilford treat a tooth where there was an abscess with a fistulous opening in the gum? Would he not fill the canal immediately after thoroughly disinfecting with bichloride of mercury and carbolic acid?

Dr. Guilford replied that he never filled at once.

Dr. Watkins. How would Dr. Guilford prepare the buccal canals of the molars for filling, when they were exceedingly fine, without drilling?

Dr. Guilford replied by asking how Dr. Watkins would treat them by drilling.

Dr. Watkins answered that he would use the Morey drill and enlarge them.

Dr. Rhein had never practiced immediate root-filling until he got these drills. They would not cut through the side of the tooth, and the danger of breaking was reduced to the minimum.

Dr. H. J. McKellops, St. Louis, Mo., was opposed to the drilling of root-canals, because he had seen so much harm resulting from the practice. The drills would not follow the canals. It was impossible to tell the shape of a root. It might be flat at one side and the canal run close to that side, and it was often impossible to put a drill in it without coming out at the side. All that was necessary was to open just a little at the mouth of the canal, and then if it could be got into at all it could be filled with gutta-percha. Dr. Guilford says he uses cotton at the apex. Did he ever extract a tooth the root of which was filled with cotton? And did he ever smell of it when he had extracted it? In filling with gutta-percha, all that was necessary was to pay attention to the work in hand, to avoid forcing it through the apex of the root. The instant the gutta-percha reached the apex the patient would feel it, and would give notice of the fact. An operator, if used to this method, could tell just about when the

gutta-percha reached the foramen. For pumping it up there was nothing better than gold and platinum broaches, which were introduced by Dr. Herbst during his late visit to this country. With these there was no fear of the broach breaking off in the tooth, and if it did no harm would be done. He had tried the Morey drill, and he had seen a great deal of destruction with it. He had a number of specimens that had been sent to him where the root was drilled through the side. A lady from Jefferson City paid \$500 in New York to have two teeth filled. Both afterward had abscesses, and in treating them the drill-holes were found, one about two-thirds of the way up, the other on the posterior side. The teeth were extracted, as they could not be saved. He had studied this subject probably as much as any man in the profession. He had seen everything that was recommended and tried everything, but he had found nothing like the method of filling with solution of gutta-percha. He did not believe in immediate root-filling; at least, he could not make it a success. He wanted to treat the tooth till he was sure it was ready to fill. The failures were not all seen at once. Sometimes it was two years before some of them became apparent.

Dr. Watkins wished to say that the Morey drills would not go through the side of the root, because the point was blunt, and the drill, cutting only on the side, would follow the canal as long as there was one to follow.

Dr. McKellops wanted to know how a drill would run in the narrow space—no thicker than tissue-paper—in the root of a lateral incisor having a double curve?

Dr. Watkins. By using small sizes such a canal could be followed clear through. In filling with gutta-percha points, if the points were dipped in one of the essential oils, the surface would be softened so that it would slide right into the canal, seal up the foramen, and cement itself to the walls of the canal.

Dr. C. P. Southwell, Milwaukee, Wis., had found that a drill would follow the hole that was ahead of it. The Morey drill merely tended to straighten up the canal. If it carried to one side it cut off from that side. The point was so made that it would not cut, and when it would go no further, that was notice to take a smaller size. He had drilled through roots before he got this drill.

Dr. Harlan was sure that if Dr. Rhein had been familiar with the literature of root-filling he would not have made the criticism he did. It was not possible to drill out the inside of a tooth with a dead pulp, so as to completely disinfect the dentine, without weakening it. With reference to Dr. Ottofy's remarks as to the percentage of immediate root-filling in his (Dr. Harlan's) practice, he had stated in the paper what classes of teeth it was proper to fill immediately, and



he felt very sure that they would aggregate more than sixty per cent. of all the cases of pulpless teeth that were treated. He felt complimented by Dr. Atkinson's statement that it was perfectly safe to fill a root when there was no pericementitis or when the apex of the root was encysted,—which he had already said in his paper. He would take issue on the faulty thereapy, but he would not accept Dr. Atkinson's definition of abscess. Dr. Atkinson made statements dogmatically, and then complained that others did the same. Did Dr. Atkinson not say dogmatically that coagulators of albumen were indicated in pulp-treatment? The air itself would coagulate albumen, and nature herself was the best healer of flesh-wounds, in every instance. Coagulators should not be used in root-canals until they were completely disinfected. Dr. Peirce said that if an abscess would not heal in twenty-four hours after the injection of a medication through the root, it was proper to treat it externally. The healing process might begin in twenty-four hours, but he doubted if it would be completed in that time.

(To be Continued.)

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## SOUTHERN DENTAL ASSOCIATION.

### THIRD DAY—*Evening Session* (Continued).

(Continued from page 723.)

THE Committee on Dental Hygiene was called, and reported a paper by Dr. W. D. Dunlap, of Selma, Ala., entitled "Dental Hygiene: A Study that belongs to the People."

Dr. Dunlap read his paper, as follows:

The writer believed dental hygiene to be the most important of all the subjects selected for special study, and perhaps the most neglected; the most important, because upon the principles embraced in its teachings depend the preservation of the teeth in normal condition; the most neglected, because the information needed is almost entirely confined to dentists. Hygiene is the only study required at the hands of dentists in which the people, old and young, are vitally interested, and which it is necessary that they should understand.

We have to-day a large corps of operators trying to save teeth, learned and skillful in every rule and device that tends to that result; well posted in hygienic principles, and neglecting no opportunity to instruct their patrons. So far this is to be commended; but a higher duty is ours. The great public, the masses, are ignorant on this subject, and seldom get within reach of a dentist, except when in pain; it needs specific instruction, good and sound instruction, and the day is at hand when text-books should be prepared to

be used in all our schools, both public and private, that should have plain and practical hygienic rules, well formulated and covering both general and special hygiene. These principles should be carefully taught, and the teachers who now notice whether the face and hands are clean and the hair properly brushed should be required to see that the mouth with its teeth are cleansed daily in a proper manner. This cleanliness should be always required, and early in life the little ones should learn what the requirements of nature are, and heed its teachings. The young can learn and form habits that will be of use to them in after days; the middle-aged and the old never do.

Let this plan be adopted, and the teachings and supervision be thorough, and a great work will be accomplished,—greater than has ever been done by our whole profession by the aid of drills, burs, chisels, scrapers, and pluggers.

While the importance of hygiene is thus pressed upon us, we would do or say nothing to underestimate efforts that are being made to arrest disease and restore defective dental organs to something like a normal condition. Incidentally I will remark that, when the people are well versed in and practice hygienic principles, the operations of our brethren will be called for at more timely seasons, and better results ensue than when work is delayed till trouble sets in.

The experience of the profession will bear me out in the assertion that the best results are achieved with the class who begin young under the care of competent dentists. This class is more regular in having their teeth examined, and, of course, in having timely work done. If this be true, let us begin with the young; and, while we call in the aid of the mothers, as attempted by Mrs. M. W. J., we must get admission to the schools with a well-formulated set of rules, and see that the schools adopt and teach them properly. Let us enlist the services of our legislatures and school boards, so that such teachings will be made compulsory.

Our profession is making rapid strides to the front, and we have reason to be proud of the position already attained; but there is a horrid skeleton yet "in the closet." Premature death and destruction surround us on all sides, and but little is being accomplished by our efforts to arrest the ravages of the destroyer. Let the records of our offices tell the tale; get the number of mouths that need no work because of perfect teeth; then the mouths of those who have timely repairs done, and compare these numbers with the number who seek the dentist only for relief from present pain. Estimate the amount of practice done in your cities and the number of patrons exclusive of the strictly toothache class, and deduct the above numbers from the aggregate number over ten years of age, and you will

arrive at a fair estimate of what proportion of the people know nothing and are careless about their teeth. Into this field it is our duty to go and teach the importance of the little mill that prepares material for the upbuilding and support of the tissues of the body. Let us teach that cleanliness is necessary; that food should be slowly masticated, and the teeth repaired as soon as needed.

We liken the grinding apparatus to a mill,—a “little giant mill.” In a perfect condition this mill should be self-cleaning, running slowly, and what is run through it at noon should remove the deposits of the morning, and so on. Man was not born with a tooth-brush in his mouth, nor would we need one so badly if we lived strictly in accordance with nature’s laws; but as we do not, these artificial adjuncts are necessary, and those who cleanse their teeth the least as a class have the greatest pathological troubles.

Dr. R. Finley Hunt, Washington, D. C., had given much attention to the subject of dental hygiene as being one of the most important dentists could consider, and he thought the paper had not reached far enough. The single point of cleanliness was not sufficient. The preparation of the cereals as food and the administration of lime-water should also be considered. We must keep the system in proper condition to assimilate the foods prepared for it, or we cannot have perfect teeth. Perfect cleanliness alone would not preserve the teeth. The machine whose office was to take care of the material for building and repairing the system must be in order, or no good would result from keeping the teeth clean. In an examination some years since of one thousand skulls, principally those of the Northwest Indians, Dr. Winder found less than one hundred defective teeth. Some of the skulls were those of Esquimaux and some Sandwich Islanders before they knew the white man, and the teeth in all were equally good. Now, the food of the Esquimaux was principally carbonaceous; that of the Northwest Indians was mixed in character,—fish, game, and cereals; while the Sandwich Islanders lived principally on vegetables: yet the systems of all could collect the materials to produce good teeth from these various foods, and deposit them in the proper manner. The facts seemed to point to the idea that the whole system must be kept in good order for this purpose.

In reply to a question as to whether he would prescribe for the mothers, Dr. Hunt said that if the mothers were properly prepared for the reproductive function, by living naturally, they would need no prescription; instancing the well-known example of the Indian woman stopping on the march to bear her child and taking up her burden of lodge-poles as a matter of course. It was hard work to get people to eat when they were hungry and only then, and stop



when they had enough. If they would only do this and take plenty of exercise and get plenty of sunlight they would go on improving till in a few generations they would arrive at the point where perfect physiques and perfect teeth were the rule instead of the exception.

Dr. W. N. Morrison, St. Louis, thought much responsibility in this line would devolve on the dentists of the future. Beautiful work was being constructed every day which soon tumbled into decay from neglect. He never saw the teeth decay under careful brushing, and he was a firm believer in the idea that if an infant's teeth were brushed carefully and it was fed on a simple diet, the development of the deciduous set would be regular, the teeth would be free from decay, and their permanent successors would take their place at the proper time and be also free from decay. He was convinced that as a rule the people eat too much acid food, such as lemons, and that they too carefully sought the tenderest morsels of meat. The Esquimaux had the toughest diet, and he believed if our teeth were used in the same way as theirs were they would not decay.

Dr. John C. Storey, Dallas, Texas, was sure the doctrine advocated by Dr. Morrison would not obtain everywhere. They had tough beef in Texas all the time, and in thirty years he had seen but one perfect set of teeth. There were two widely differing natural divisions of the country in Texas, the "limestone" and the "pine-woods" districts, marked by distinctive points of difference in almost every way; and he claimed that he could almost certainly tell by examining the teeth whether a man was reared in the piney-woods or in the limestone district. In the limestone districts the osseous system was splendidly developed; the teeth large, strong, and well-formed. In the pine-woods the teeth were beautiful, but they were frail, and apparently had no enamel to speak of. But the teeth in the limestone regions were surrounded with tartar and were lost in that way, and not through decay. He would like to know if there was any way to change the environment so as to get rid of this superabundance of mineral constituents.

Dr. W. H. Morgan, Nashville, Tenn., had taken in the doctrine of lime-salts when it was first promulgated, but an examination of the food question had convinced him that there was very little in it. Rice had more mineral constituents than would supply the animal economy with all it needed for building up and repair. The poorest flour contained  $1\frac{1}{2}$  per cent. of mineral matters,—more than the organism could possibly use. The trouble was in the assimilation, and whatever might be done toward improving this would tend to more perfect development, not only of the teeth, but of the entire organism as well.

Dr. W. H. Gingrich, Norfolk, Va., had found the most perfect set

of teeth he had ever seen in the mouth of a man who never brushed them. All the cleaning they received, aside from that which they got in mastication, was simply by their owner's wiping them off with his sleeve.

Dr. J. Y. Crawford, Nashville, Tenn., felt that dental hygiene was one of the most important questions that now addressed itself to dentists; and further, that it was one of the most important that the American people have to contemplate from a health stand-point. Statistics, so far as they have been gathered, showed that a very large proportion of young persons did not have normal mouths,—in proper condition to perform the function of mastication as it should be done. He found that many persons preferred hygienic dentistry to taking care of their teeth. If we could follow up the suggestions of Dr. Dunlap's paper with the enthusiasm of its writer, we would do more to improve the condition of the teeth of the people in general than by any other means. This subject had not received the consideration of the public. One brushing a day was not enough for modern teeth; nor two, nor three. What was wanted was absolute cleanliness. Then back that by dietetic measures, and the teeth may be brought to a normal state; but you will not thus bring the people to barbarism. He expected to labor in the direction of securing hygienic care of the teeth more ardently than in any other field of dentistry. It interested not only the present generation, but it reached to those unborn. All that should be done could not be accomplished in one generation, but a beginning could be made, and we owed it to ourselves to confer the lasting benefit of sound instruction on the human family.

Dr. Hunt wished to reply to one statement of Dr. Crawford's. If it were possible to bring about perfect dental prophylaxis, the use of the tooth-brush could be dispensed with. The man who rubbed his teeth with his sleeve had a system in perfect order, so far as his teeth and gums were concerned. It was an instance of perfect assimilation. He would agree with Dr. Crawford that it could not be expected that all the evils could be cured in one generation. As the character of the assimilation was improved in the mother, it would be improved in her children, and so the change for the better would go on. It was not necessary to live like barbarians. We could be cleanly, we could use the proper foods, we could take proper exercise, and that would not be a return to barbarism; but such a course persisted in would bring the human body to a perfect condition and keep it so.

Dr. J. B. Hodgkin, Washington, D. C. People's constitutional, peculiarities were laid down in certain lines, with which individually they had nothing to do. His own father had died in his eighty-

first year, and had perfect teeth, never having lost a tooth or used a tooth-brush; and he had a horror of dentistry. As he had said, people's constitutions were laid down in certain lines, and when these lines were laid down, away back in their ancestry, they were stamped upon all who should inherit this or that particular line, forming what was known as types. When these types were stamped the character of teeth that went with each type was also determined. The individual character of each type was stamped ineffaceably upon it, and there it would remain.

Dr. W. H. Atkinson, New York, thought there must have been a good many stamps needed. Hygiene meant healthy; healthy meant whole-thy, which meant that the organ or organism to which it was applied was in perfect working condition. None of the suggestions which had been made here reached down to the basis of the entire matter, until Dr. Hodgkin put forth his idea of the "stamp," and even he did not clearly indicate the whole meaning of the term. Without an understanding of embryology one could not know the process of assimilation. The various steps in the differentiation of protoplasm have been made out, and it was through the knowledge of these that we got hold of the principles of function, and thus had something to hold by. Of what use were the teeth? Primarily, it would be said, to comminute the food. Did milk need comminution? The milk had been comminuted in its formation, and it held within it the stored radiancy, the elements of nutrition. Did you ever see irregularity in the teeth of a baby that didn't have cleft-palate, or some such interference with the normal order? The carnivora used their teeth to seize and mash their food, so as to prepare it to go into the gullet. When the natural mode of feeding was followed the food itself and the exercise of mastication would keep the teeth in perfect order. The highest aim of the professional man should be to so teach the subjects he dealt with that the people, profiting by his instruction, would no longer need his ministrations. If all used their teeth in the mastication of food as the boys in the wheat-field when they chewed the grain until the tough gluten was transformed into a gum, the teeth would get the proper exercise. Chemistry has been called an inorganic act. It nevertheless was true that crystallization was the physiology of the mineral kingdom; cellulation was the physiology of the vegetable kingdom, and corpuscularization was the physiology of the animal kingdom. The best way to help others to our knowledge was to tell them just how we got hold of these things.

Dr. Geo. J. Friedrichs, New Orleans. They have said that the organism was stamped, and that it would develop according to its type, and that we had no control over this development. According



to Darwin, in his theory of evolution, we did have it in our power to direct this to some extent, at least. We certainly did have some control over the development of the human body. It was well known that if the organism was starved it would not have so perfect a development as if it was well fed. Then, again, take two seeds and plant them in the earth. By varying our management of the two, one could be made to thrive thrice as well as the other.

Adjourned to meet at 10 A. M. to-morrow.

At the next morning's session Mrs. M. W. J. (Mrs. Dr. J. R. Walker), by request, gave a brief account of her experience with prophylactic measures. She had had five children, and there was every reason to anticipate that they would all have poor teeth, on account of inheritance from both parents. All who were acquainted with Dr. Walker knew his views on the subject of lime-salts as a preventive of poor teeth, and how he tried to indoctrinate others with his ideas. Their first child had thirteen fillings in its mouth at three years of age. Then the plan of administering lime-water was adopted, and no more fillings were needed in the child's baby teeth, and these were succeeded at the proper time by fine, regular, sound, and strong teeth. The only fillings so far were in some of the fissures, which Dr. Walker cut out and filled, not because there was decay but to prevent its occurrence. The same system of feeding was adopted with the other children, and now, at ages ranging from eleven to twenty years, they each had teeth above the average, except one child, in which case the difficulty was readily explained on other grounds. Dr. Walker, who was an enthusiast on the subject, had many instances of the success of this treatment in his practice.

Dr. Dunlap stated that by an oversight the resolution adopted by the Alabama State Dental Association was not here, and he asked the privilege, which was granted, of forwarding an official copy by mail. Its substance was that the rapid strides made by dentistry in all its branches imposed on dentists the duty of making known to the people in a practical way the advantages to be derived from instruction in dental hygiene; that the time was now at hand when a practical lecturer should be employed to visit the public and private schools for the purpose of delivering plain and simple lectures for the instruction of the pupils and the public in the proper way to care for the teeth; and that the Alabama association recommended and urged the Southern Dental Association to take steps to the above end, pledging itself and its members to contribute to the fund necessary.

Dr. Dunlap's statement was accepted, and the matter was laid over till next year.

Dr. W. H. Richards, Knoxville, Tenn., thought that right now

was an opportune time to direct the attention of the government officials to the desirability of some measures for the care of the teeth of the common soldier. It was only necessary for a casual observer to go through the government grounds here connected with Fortress Monroe to witness the shocking condition of the teeth of these men. He was aware of the objections raised years ago to the appointment of dentists to the army and navy. There was a time when some attention to the teeth was required; but the adoption of the breech-loading gun had obviated the necessity in actual service of good teeth, and no attention appeared to be paid to them. The adoption of some measures to insure proper dental attention and the necessary care of the teeth would, in his opinion, be beneficial to the men and the service alike.

The subject of Dental Hygiene was passed.

(To be Continued.)

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### FIRST DISTRICT DENTAL SOCIETY, STATE OF NEW YORK.

THE First District Dental Society of the State of New York held a regular monthly meeting, Tuesday evening, October 4, 1887, in the rooms of The S. S. White Dental Manufacturing Company, Broadway and Thirty-second street.

The president, Dr. W. W. Walker, in the chair.

Dr. C. S. W. Baldwin, of the Clinic Committee, presented the following report, which was read by the secretary:

#### CLINIC REPORT.

There were over one hundred and twenty-five dentists present at the afternoon clinic on October 4, 1887, all sections being represented; several from Brooklyn, Newark, New Haven, Bridgeport, Freehold, and two of our brethren from Europe. . . . Dr. E. Parmly Brown, of Flushing, Long Island, exhibited some very interesting specimens of antique dentistry,—a case of bridge-work, made by Dr. Greenwood, who practiced in this city one hundred years ago. This specimen was obtained from his son, so that its authenticity, as well as those of the others, is unquestioned. The case was where a block of three teeth had been carved from a piece of walrus-ivory and screwed to one root, the remainder of the bridge or block resting on the gum. Also, the upper and lower denture worn by the veritable father of our country. The upper plate was of gold. The twelve teeth were carved from walrus-ivory in two blocks, the lower denture being three pieces of ivory. In a recently published autograph letter Washington says he “suffered from many dental infirmities.” Judging from the repairs with gold wire and numerous makeshift fasten-

ings with the coiled spring to hold them in place, we do not wonder at his speaking of them as "infirmities." Dr. Greenwood's son gave this plate to Dr. John Allen, who presented it to the Baltimore College of Dental Surgery, through whose kindness Dr. Brown made the exhibit. It was noted that the ivory work done by the American dentists showed the enamel of the walrus-ivory, while in those of English make the enamel was absent, as was the case in the plate worn by the Duke of Brunswick. Dr. Colby, who did this kind of work in England, was present. He said the first thing a student was taught to do was to cleave off the enamel from the walrus-ivory by heating it in a furnace; then throwing it into water. . . . Dr. W. E. Truex and Dr. William C. Deane presented casts of regulating cases, asking counsel as to the mode of regulating. In both cases the lower jaw protruded. Advice was given to expand the arch of the upper denture and contract the lower. Most seemed to favor the rubber-ligature method. . . . Dr. H. A. Parr separated teeth in a very short time with his new separator. . . . Dr. E. T. Starr, of Philadelphia, showed the duplex-spring and slip-joint connection for the S. S. White, Johnston, and Shaw dental engines; also, new patterns of angle hand-pieces, the hand section being of wood and shaped to fit the fingers. This attachment offered an easy means of changing one hand-piece for another,—*i. e.*, when one hand-piece is used for delicate work another can be used for polishing or rough work, thus securing longer wear to a finely adjusted hand-piece. . . . Dr. F. M. Smith was present with a patient having a pulpless tooth with an hypertrophied gum-tissue over the lateral incisor, arising from the abscess. It was believed to be amenable to treatment like other pulpless teeth. . . . Dr. J. M. Crowell baked two pieces of his body gum on gold plate with his five by seven-inch automatic furnace. He says this furnace will run four hours with little attention and expense. . . . Dr. C. S. Wardwell presented a rubber piece for the engine treadle, which prevents the foot from slipping, though held in any position on the treadle. . . . The greatest interest and enthusiasm was shown in the clinic when Dr. Atkinson extracted a first bicuspid for Dr. W. J. Younger, which had been implanted seven months. The object of the operation was to show the condition of the pericementum and character of the union. The doctor wished to expose himself to this treatment so that the tooth might be cut into microscopic slides, thus further proving his methods. This was the fourth tooth he had had in this place. Two had been transplanted which, owing to imperfect union, did not remain in place long; after a year's time his brother in San Francisco implanted the present tooth. Upon extracting the tooth it proved to have a very small root, only partly attached. Blood flowed freely. On applying



the new tooth, the socket proved not deep enough. After taking the measure of the tooth to be inserted, the socket was enlarged with a trephine and conical fissure-bur. The tooth, previously disinfected, was inserted and ligated to a gold plate on the inside which Dr. H. A. Parr had previously prepared for the case.

Dr. W. H. Atkinson made the following additional report:

We have to report a very interesting and successful meeting, and it was thought that the increased interest was awakened by reason of the six hundred invitations that were sent out, on very short notice, after we learned that we could have the attendance and coöperation of Dr. Younger. I did not see all that was presented there, but two cases that I had carefully under my view I will say a few words about. One was a case of what was called epulis, and which was only an ordinary abscess on the left superior lateral incisor, involving the transverse process between the incisor and the cuspid; and which had burrowed a channel to where the dental ligament unites the gum to the neck of the tooth, and there was hypertrophy of the gum-tissue. It was a neglected case of a dead pulp, and very plain to anyone conversant with the diagnosis of such conditions. The tooth only needs to be opened through the lingual border, the entire length of the canal cleansed thoroughly, filled, and I was going to say treated. That depends altogether upon whether the other part was perfectly done. It needs no other attention at all if, after going through the end of the root up to the abscessed cavity, the peroxide of hydrogen, or creasote and oil of cloves, is pumped through until it makes its appearance at the fistula. It is even unnecessary to clip off what was called epulis. Dr. Younger's case is one of intense interest, for its novelty and for the earnestness and zeal he has manifested in having four teeth set into a single socket, one after the other, and watching their action in order to report the results for the benefit of science. There was a right superior first bicuspid in healthy condition, so far as his personal comfort was concerned, but which did not quite occlude with the lower teeth in closing the mouth, and which had been intentionally kept loose by wriggling it, for the purpose of preventing a deposit of bone on the sides, in order that it might be extracted in due time and examined to determine the nature of the bond of union between the socket and the tooth. There was no bony alveolar plate either front or back. When I pressed upon it, it resisted as much as the other teeth. He had eaten upon it continually for several months without inconvenience; but in attempting to pull it down, to see whether there was a disposition to be elastic, I found no more elasticity than in the other teeth. I removed the tooth and put it at once into a sterilizing fluid and took it to Dr. Heitzmann, and left it with him for further examination. The point

I wish to announce is the proof to my perception of the correctness of the doctrine that all secondary growths or healing processes pass through the same kind of molecular changes that the original formations do. On the inner wall at the junction of the inner plate of the alveolus and the transverse plate was found, when attempting to slip in the tooth to be inserted, a resistance, and in feeling for it I found that there was a hard substance there. I then took the measure of the root and of the already formed socket and burred it out to the length which I had measured for it to go, with the smallest-sized trephine of Dr. Younger's set; then tried to put the tooth in, and found it still resisted at that place, on the inner part of the transverse process between the cuspid and the lost bicuspid. I took a conical fissure-bur—the instrument he uses to enlarge the socket—and was so fortunate as to cut away just enough, so that when the tooth went in it was held tightly and nicely. The point that I wish to bring your minds to bear upon is the coming in contact with no bony matter, except this little point that seemed to have projected forward where his shaking had not interrupted the stillness of the lime-salts which form bone. There was mixomatous tissue there, and blood-tracts; not blood-vessels, but like what we see in an incubating egg, or any growth where the blood-tracts precede the organization of tissue. When the tooth was taken out, the patient's mouth was so full of blood that when he ejected it into the spittoon it covered the towel on his breast. I did not think it was incumbent upon me to go further up, feeling there was sufficient embryonal tissue. I washed out the socket with a sterilizing fluid said to be a solution of corrosive sublimate; then dipped the tooth, which had already been filled in the pulp-chamber, into the sterilizing fluid, and carried it into its place, where it would pretty nearly occlude when he closed his mouth; it did not quite allow the other teeth to come in contact. I then told him to press hard enough to feel the other teeth upon it, which he did, and it went to place. When it went to place it filled the chamber and socket so full as to distend the gum and drive the blood out of it so as to whiten it for a few minutes. Dr. Parr had previously taken an impression and struck up a plate to go on the inner border, and he threaded it with silk, and held it in place, while I tied it to the cuspid and the second bicuspid.

Dr. W. D. Tenison. Mr. President: With reference to the operations of Dr. Younger, I would like to say that a year ago this month Dr. Younger implanted a tooth for a patient in my office. I saw the patient yesterday, and the tooth is perfectly firm.

Dr. J. Bond Littig. I would like to ask Dr. Atkinson whether there was any pericementum perceptible on the root of the tooth he speaks of after its extraction?

Dr. Atkinson. There was an appearance just like that of healthy teeth which I have extracted. At the very point of the root I was not able to detect any fuzziness,—that is, fibrils of connective tissue. I did not look at it with a glass. It will be put in chromic acid and then examined microscopically.

Dr. V. H. Jackson. In 1885 I reported a case here of the removal of a supernumerary tooth attached to a lateral incisor. I sawed the two teeth apart, finding they were attached their whole length, and reset the lateral. Necessarily the pericementum was cut away from one side. I have the part that was sawed away with me this evening. The lateral which I replaced is still in the mouth, and is well preserved, with the exception of a slight absorption at one side. I filled it with Hill's stopping about two months ago. When the tooth was inserted it was very much out of position, and I have since regulated it and moved it some distance, which naturally interfered to a certain extent with the attachment.

Dr. Edward C. Kirk, of Philadelphia. Mr. President: It is one year ago this month since my interest in this operation of Dr. Younger's was excited by seeing him clinic before your society. Since that time I have implanted teeth in nearly a dozen cases, and up to this date they have all been uniformly successful with one exception, the circumstances attending which case I will explain further on. In the meantime I want to call your attention to some modifications in the details of performing the operation which I have adopted, and which are different from those pursued by Dr. Younger at the time I saw him demonstrate. I find it desirable to perform the operation without an anesthetic. I think that, when it is properly performed, an anesthetic is entirely unnecessary. So far I have operated for but two men; the rest of the patients were women, all of them nervous, and some of them deficient in that nervous stamina which is necessary to the endurance of such an ordeal. After the operations were performed I questioned the patients as to the amount of pain endured, and whether they would undertake it again under like circumstances, and they all said substantially that they "would be perfectly willing to go through it again to accomplish the same result." I find that I can perform the operation with the least discomfort to the patient, and accomplish better results, by dispensing with the trephine of Dr. Younger altogether. After making the dissection through the gum, as Dr. Younger advises, I enter the process and make a cut through the bone the desired depth with a wide and measured spear-pointed drill mounted in a Bonwill surgical engine, or a Bonwill dental engine with a driving-wheel of the largest diameter. I prefer the old Bonwill engine with the large and heavy driving-wheel. The spear-



pointed drill is flat, probably  $\frac{3}{8}$  of an inch in width, and sharpened to a keen edge. Having a speed of from 1,000 to 30,000 revolutions per minute at your command, you can make the cut instantly and almost painlessly. I follow the drill cut and form the socket with an instrument like a coarse tapering fissure-bur, of which I have two sizes, the larger having five and the smaller four very sharp cutting

FIG. 1.

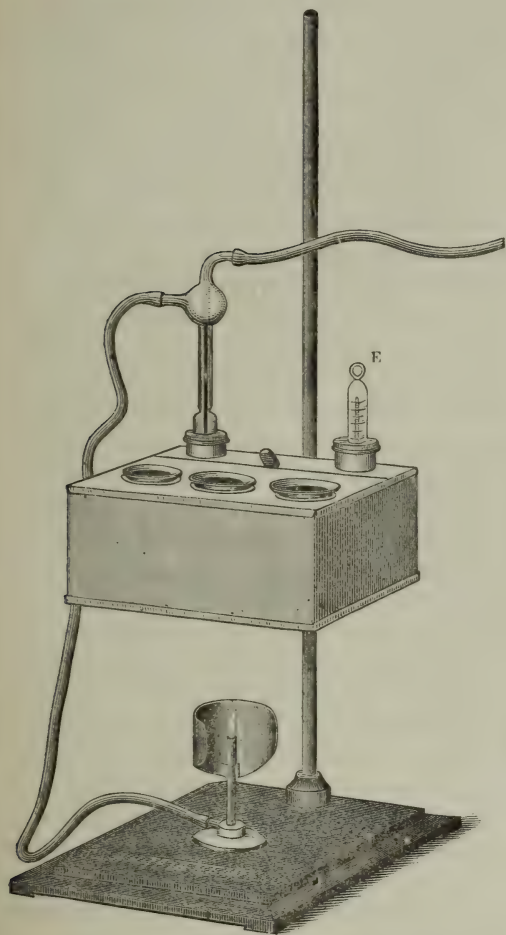
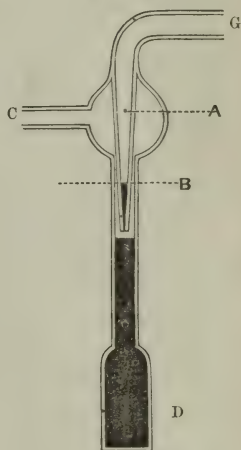


FIG. 2.



leaflets winding spirally about the shank. The spiral knife of Dr. Rollins and the crib knife of Dr. Otoffy are good socket-formers, but for my own operations I prefer the coarse bur which I have described. The further steps in the operation are similar to those pursued by Dr. Younger.

Ordinarily it is advisable to have an assistant who is well ac-

quainted with the details of the operation; but I have devised an apparatus, a little water-bath, for maintaining the sterilizing solution of mercuric chloride and the water automatically at a constant temperature, without which, unless you have some one to look after these matters, they distract your attention from the operation. I have used this apparatus with much satisfaction, and I have brought it here for your inspection. It enables you to dispense with a trained assistant, which personally I consider an advantage, as it leaves me entirely independent. The apparatus (Fig. 1) is a simple copper box, nickel-plated, with a lid perforated with three holes for the reception of three glass vessels; in one of which you have your mercuric chloride solution, 1 part to 1,000; in another, distilled water; and in the other I like to have a somewhat stronger solution of mercuric chloride, about 1 part to 500, for instruments or wiping out the socket. I want to be sure that my instruments are absolutely sterilized, so that they cannot possibly convey any specific taint from one patient to another, and also that micro-organisms of whatever character may be completely excluded as a factor in the operation, whereby undue inflammatory action may be avoided and union by first intention induced. So I have this stronger solution at hand for wiping off my instruments and sterilizing them. A thermometer (E, Fig. 1) is attached to the bath, and also a thermostat (F) of my own devising. This thermostat (see Fig. 2) can be set at any desired temperature. The gas (G) passes from the street main through the tube at the top of the bulb, and passes down through the contracted neck, terminating in an end which is ground off at an acute angle. There is a small hole or orifice (A) on the side of this inlet-tube within the bulb which will allow only enough gas to pass to barely keep the little Bunsen burner alight. The lower portion of the instrument is a bulbous expansion filled with mercury. When the temperature in the bath rises to the degree at which the mercury is set (and for these operations I use 103° F.), it gradually expands and closes off the flow of gas from the free end (B) of the delivery-tube, and the flame of the burner as the mercury rises towards B goes slowly down, but not out, as the small orifice in the side of the delivery-tube allows enough gas to pass to keep the burner alight. It is perfectly automatic in its action. By this means, after the bath has reached the temperature at which the thermostat has been set, the water is kept at a constant temperature, and the tooth that I am to use can remain in the bath without thought on my part as to its being overheated. I have believed that the thorough soaking of the tooth to be implanted is advantageous; I won't say essential. It enables you to better examine it for any faulty places in its pericemental membrane. You get a bet-

ter view of it than if you simply moisten it, because the moistening does not give the membrane time to swell.

After I met Dr. Younger here at your meeting last October he kindly consented to come to Philadelphia and operate for a patient of mine. He performed the operation there, and it is a success up to this time, with some modifications. The tooth he used was of uncertain age; it certainly had been out of the mouth a considerable length of time. It was a left superior bicuspid, and upon its buccal aspect a portion of the root was denuded of its peridental membrane. Union took place over every portion of the root except that where there was no peridental membrane. There has never been any union at that point. Otherwise, the tooth is perfectly firm in the socket, and answers all the requirements of mastication.

The cases in which I have operated myself are uniformly successful, with the exception to which I alluded at first. I have here a model of the mouth as it was before I operated. There are two superior left bicuspids missing. The operation was done on the 23d of January of this year. Before the gentleman came to my office I selected two teeth out of a number that I had, and they were satisfactory to me; but when I came to measure the space I had to fill I found that these teeth would a little more than fill it; so I was driven to select one new tooth, or else cut down either the teeth to be implanted or the teeth in the mouth. I decided not to cut, but to select another tooth. My second choice was not as good as the first, because the peridental membrane was deficient on the buccal aspect of one of them. However, the case was a favorable one otherwise, and I trusted to nature to bridge over this denuded area. I operated upon the first bicuspid first, forming the socket and securing an unusually good adaptation, satisfactory in all respects. When the tooth was in position there was absolutely no motion, and I found it was unnecessary to even ligate it. When I came to insert the second bicuspid the patient became restless, was somewhat nervous, and I was therefore not able to secure as thorough a mechanical adaptation in that case as I had in the first. But the tooth used had a perfect peridental membrane upon it, and it was apparent within a week that union would be obtained, and when I last inspected it during the summer it was firm, the gum in a healthy condition, and perfectly satisfactory.\* The first bicuspid, on the contrary, became gradually looser, and about the 10th of June the gentleman coughed it out of his mouth. He brought it to me, and I have the specimen here. The tooth never was tight after the

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\* Since the report made at this meeting of the First District Dental Society, we learn from Dr. Kirk that the second bicuspid in this case has also been lost by absorption. See Hints and Queries in this issue.—Ed. DENTAL COSMOS.



first week. I hoped against hope, thinking it might unite and become firm; and when I saw it would not I decided to allow it to come out by natural process in order to see how nature would get rid of it. I found that the osteoclasts had eaten up the root almost entirely. It was an unusually long one. I think the case is interesting and worthy of note from this fact: here were two teeth implanted in the same mouth, in the same location, and at the same time, the only difference in the conditions that I could see being that one had a perfect periodontal membrane while the other had a defective one. I intend in the course of six months to implant a tooth with a perfect periodontal membrane in place of the one that has failed; and if I get success in that case, I think it will demonstrate pretty definitely that a perfect periodontal membrane is essential to success in these operations.

As bearing upon the question of implantation, I will say that the last operation of this nature which I performed was done at 9 o'clock this morning for a patient of Dr. J. Foster Flagg, a lady for whom I transplanted a central incisor, and in a note which he wrote to me at the time of referring the case to me he gave me the statistics of some operations of transplantation. I have his permission to use them, and I think they will be interesting to you. He says: "I have transplanted and replanted in all seventeen times. Fifteen were successful; two were failures. The average duration was about thirteen years." If an average duration of thirteen years can be shown, I think we should be justified in performing this and its kindred operation of implantation wherever it is desirable and expedient.

Dr. Wm. J. Younger. Gentlemen: This is the first time since I was made an honorary member of your society that I have had the pleasure of being present at one of your meetings; and it is one reason that I remained over in your city until to-day. I had intended leaving for San Francisco on Sunday morning. Another reason was this: Last year when I was here it was said that the success of implantation so far was due only to the mechanical adaptation of the teeth to the socket, and that there was no living attachment of the tissues. So seven months ago I had a tooth implanted in my mouth for the purpose of showing the profession that attachment would take place and that the retention of the teeth would be secured by means of its attachment to the gum and the living tissue around it; for union with a dead tissue could not take place. If there is a union it is sufficient to prove that neither of the substances was dead. I had a first bicuspid implanted in a territory upon which I had been experimenting for several years. Several years ago I lost a bicuspid by reason of disease. I immedi-

ately had a tooth transplanted, and union took place around the neck of the tooth, but the tissue had not become healthy, and it was not satisfactory, as I removed the tooth and transplanted another, which behaved better. It attached very well, but there was no pericementum upon the labial aspect of the root, and the result was a shrinking away of the tissue. So I had that removed and allowed the wound to heal up. Two years after, which was about seven months ago, I directed my brother to dissect away the gum and implant a tooth which I found amongst some that I was looking over. I do not know how long it had been out of the mouth, but not more than two or three months, I think. He said that when he dissected the gum away the tooth barely touched the alveolar process and simply rested against it. He wanted to get another tooth. I said, "No; I want no bony attachment whatever; and as soon as the attachment of the soft tissues has taken place I will remove the ligatures, and I will keep it loose by moving it, so as to show that it is not held by mechanical union at all, and that there must be living union." That has been done; I have been continually moving it so that erosion would result and cause adhesion of the osteoclasts, and thus produce absorption. I have not seen the root since it was removed. I showed this tooth to Prof. Heitzmann and other learned gentlemen at dinner the other evening, and also to-day, and I think it must have been plain to them, from the fact that it could be moved so easily, that there was no mechanical union to hold it in place. The ridge or bony process of that tooth was higher than that around the other teeth, and it did not articulate with the teeth in the lower jaw; and that tooth has not descended a particle since it was inserted. To-day before it was removed it occupied the same position exactly as when it was placed in the jaw; showing the tenacity of the attachment between the gum and the pericementum. I want you to see the character of the membrane around the root of that tooth. As I said to Dr. Heitzmann, if I am wrong I want to know it; and if I am right I want you to know it, and proclaim it to the scientific world. So far as the practical results are concerned, I think there must be living attachment, or something that is equivalent to it. Microscopical changes have occurred, or conditions that will develop to you later on. I have done the best I could to arrive at the truth in this matter, and time will tell what it is.

Dr. Atkinson. I can hardly express my gratification to Dr. Kirk for the presentment he has made to-night, and the very clear mental forestep that he has suggested by the delineations of the different manner in which different tissues receive teeth. The question has been agitating the world of pathology, What is the nature

of the change where that which he called osteoclasts occurs? That is a point of new departure, and an important antecedent step was suggested in his remarks about the absence of perfect health in the peridental membrane; and this delineation that we have just had by Dr. Younger, and his asking whether there was a bony union of the root and the alveolus, looks in that direction; and I want to commend as scientific and natural his inquiry about that, asking not why is it, but how is it and what is it?

Dr. Dwinelle. It seems to me, Mr. President, that the grand problem to solve in this connection is the possibility of there being a dormant vitality in the pericementum of a dry tooth; and it would seem, from what has been done, that this has been very nearly proven. We have a great many analogies in nature to justify us in believing that there is such a dormant or subjected vitality or life principle that we must recognize, and which under favorable circumstances can be resurrected into life in its primal normality. Among the lower orders of animals we are not at a loss to find illustrations of this character. It is perfectly well known that a low order of microscopic animals can be desiccated and reduced to an almost impalpable powder, and yet when placed on a microscopic slide and brought into conjunction with warm water, heat, etc., and examined under the microscope, it will be seen to be swarming with vitality. We observe like phenomena in the vegetable kingdom. As we bore an artesian well, at each successive thousand feet that we go down the soil is thrown out, and when subjected to the influences of the sun, rain, etc., the next season we find a new order of grass corresponding to the new soil, and differing according to the depth from which it was taken; showing that a principle of life has been hidden in the depths of the earth for thousands or millions of years to be finally resurrected. We know that a fish can be frozen up in a cake of ice, and remain there indefinitely, and when the ice is thawed he resumes his normal vitality. And now here comes the test as to whether warm-blooded animals are similar in this respect to the lower. Instances multiply upon us as we investigate this subject. The practical question before us is, Does dry pericementum retain its principle of vitality? It would seem to be so from analogy and from the experiments that have been made. I can hardly imagine the limits to which this new field of operation and discovery will not extend. It goes into all branches of osteology, wherever the welfare and good being of man goes; and if Dr. Younger has established this thing I regard him as one of the benefactors of our race, and one of the brightest lights of our profession.

Dr. W. H. Atkinson here read a paper entitled "In View of Past History of Sowing, What shall the Harvest be?"



The accumulation of other matter precludes the publication of Dr. Atkinson's paper in full. It was devoted to a consideration of the progress of the race in knowledge, as illustrated by the Stone, Bronze, and Iron ages, and in the history of the methods adopted by the priests and healers of early times—the healers following the lead of the priests in excommunicating recusant members, until, better counsels prevailing, redemptory methods were adopted; in the church discipline and rectification instead of exclusion and abandonment; and on the part of the healers, of conservative treatment of organs and parts instead of amputations and excisions; and in contagious diseases, seclusion and care instead of banishment as unclean, and therefore unworthy of sympathy and help. It was only after the lapse of ages that the rule of prophet, priest, and king, holding sway as by divine endowment, merged into classified order in divinity, medicine, and law. Then followed the assumption by the teachers of the right—authority—to decide what was true and binding upon all who claimed to be their pupils.

Dr. Atkinson gave a résumé of the gradual evolution into the recognition that authority resides alone in the individual consciousness,—the culture and illumination of which marks the degree of knowledge attained.

The paper reviewed the history of the rise and progress of dentistry, tracing the successive steps by which knowledge was imparted to the student by individual practitioners for large fees and long service; but competition reduced the time of pupilage and the compensation demanded, until certificates of qualification were granted after a few days devoted to the copying of recipes and handicraft tricks in the private back room that served as workshop and college. Charlatanism and incompetency were the natural results, and the professionally inclined practitioners of dentistry were thus led to the attempt to establish a dental department in a medical school. This failing, a special charter for an independent dental school was obtained, and this led the way to the establishment one after another of the twenty-six schools of dentistry which are now confronting pupils.

In the essayist's opinion, the greatest good of dental colleges has come through the practical teaching of the daily clinics held in them, and the present advanced status of dentistry is due, more than to any other one cause, "to the habit of pooling our strength in showing each other our best methods in clinics, whenever opportunity offers in private office, society, or congress of our fellows."

President Walker. We have with us this evening several distinguished gentlemen from abroad, and the First District Dental Society cordially welcomes them, and invites them to take part in the

discussion. I refer particularly to Dr. M'Leod of Scotland, Dr. Wedgewood of England, and Dr. Grevers of Holland.

[The responses of these gentlemen and the remarks which followed we have been compelled for want of space to lay over until our succeeding number.—ED. DENTAL COSMOS.]

### WISCONSIN STATE DENTAL SOCIETY.

At the annual meeting of the Wisconsin State Dental Society, held in Milwaukee, July 19-21, 1887, resolutions relative to prosecutions in patent cases were adopted. They were substantially the same as those originally passed by the First District Dental Society of the State of New York, and may be found at page 461 of the DENTAL COSMOS for July, 1887.

### CONNECTICUT VALLEY DENTAL SOCIETY.

At the annual meeting of the Connecticut Valley Dental Society, held at Springfield, Mass., October 27 and 28, 1887, the following officers were elected for the ensuing year: R. R. Andrews, president; F. W. Williams and George W. Lovejoy, vice-presidents; George A. Maxfield, secretary; and W. F. Andrews, treasurer.

GEO. A. MAXFIELD, D.D.S., *Secretary*, Holyoke, Mass.

### ODONTOLOGICAL SOCIETY OF PENNSYLVANIA.

A SERIES of Clinics will be held at the depot of The S. S. White Dental Manufacturing Co., Twelfth and Chestnut streets, Philadelphia, under the auspices of the Odontological Society of Pennsylvania, in connection with their monthly meetings.

The first Clinic will be held on Saturday, December 3, 1887, at 2.30 P. M., when Dr. C. N. Peirce will demonstrate the filling of a tooth with soft gold under water, and Dr. E. C. Kirk will demonstrate Dr. W. J. Younger's operation of "implantation."

The operators for future clinics will be duly announced. Members of the profession are cordially invited to attend.

D. N. MCQUILLEN, D.D.S., *Chairman Clinic Committee*.

### MASSACHUSETTS DENTAL SOCIETY.

THE twenty-third annual meeting of the Massachusetts Dental Society will be held in Boston, on Thursday and Friday, December 8 and 9, 1887.

G. F. EAMES, *Secretary*,  
62 Trinity Terrace, Boston, Mass.

**ODONTOLOGICAL SOCIETY OF WESTERN PENNSYLVANIA.**

THE regular quarterly meeting of the Odontological Society of Western Pennsylvania will be held at No. 953 Penn avenue, Pittsburgh, Pa., on Tuesday, December 13, 1887.

H. DEPUY, *Secretary*,  
No. 72 Wylie avenue, Pittsburgh, Pa.

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**EDITORIAL.**

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**SUPPLEMENTAL PAGES.**

OUR subscribers get the benefit of a half form of additional reading matter this month. We found it necessary to add the extra pages to relieve a pressure of interesting material on hand and in prospect, as also from the length of our reports of the Dental Section of the late International Medical Congress and of the national associations.

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**FIRST DISTRICT DENTAL SOCIETY'S ANNIVERSARY.**

WE are informed that the programme in full of the nineteenth anniversary meeting of the First District Dental Society of the State of New York, and also information as to railroad rates, hotel accommodations, etc., will be ready for publication in the January issues of the dental journals. Strenuous efforts are being put forth by the officers of the society to make this meeting a memorable one.

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**THE OLDEST GRADUATE.**

IN the report of the proceedings of the Dental Section of the International Medical Congress, published in our November number, it was stated that Dr. W. W. H. Thackston, as the oldest living graduate in dentistry, welcomed foreign guests, and Dr. Taft, in his opening address, alluding to the establishment of the first dental college (the Baltimore College of Dental Surgery), used the following language: "In the first class there were two graduates, Robert Arthur and R. Covington Mackall. Both of these have passed away, but there is present to-day the man (Dr. Thackston) whose degree in dentistry antedated that of any other living person, he having graduated in the second class of the Baltimore College."

Dr. Mackall is still living, at Elkton, Maryland; is in good health, and has just been elected to the Maryland Legislature. He is there-



fore the only living graduate at the first commencement of the first dental college established in the world. His degree was conferred in 1841, less than forty-seven years ago, and in the coming commencements the graduates will probably number nearly seven hundred.

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#### THE CONNECTICUT VALLEY DENTAL SOCIETY'S ANNIVERSARY.

THIS society celebrated its twenty-fourth anniversary, October 27-28, by a special tribute to its first president, Dr. F. Searle, who has been in active professional practice for a full half-century. The society adopted laudatory resolutions, and appreciative letters from dentists and others were read. The mayor of Springfield and prominent professional gentlemen personally expressed the high esteem in which Dr. Searle is held by his fellow-citizens.

The resolutions, letters, and addresses were a great surprise to their recipient, who had just previously read before the society a paper recounting briefly his experience of fifty years in the practice of dentistry. The paper will form part of the society's proceedings, which, when published, will give all the details of this interesting and unique anniversary. The society in thus honoring Dr. Searle has reflected honor upon itself and the dental profession. The DENTAL COSMOS is in hearty accord with this due recognition of the professional and private worth of Dr. Searle.

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#### CORRECTION.

DR. M. H. FLETCHER, of Cincinnati, calls attention to two errors in the report of the International Medical Congress in our November issue. Dr. Andrews's paper was illustrated by "photo-micrographs," not by "micro-photographs," as stated, the images being thrown on the screen by means of the stereopticon. Dr. Fletcher himself, in exhibiting his specimens, used the "projecting microscope." As the terms "micro-photograph" and "photo-micrograph" are frequently used synonymously, it may be well to add that the former refers to a photograph of a large object reduced to such a size that a microscope is necessary to see the details of the picture; while the latter is the term used to describe a photograph of a microscopical object, the photograph being large enough to show the details without the aid of a magnifying glass. The "projecting microscope" throws upon the screen an enlarged image of the microscopical specimen itself, with its natural colors and varieties of shades. It was employed by Dr. Fletcher because such an illustration was necessary to a full explanation of some of the main features of his paper.

## BIBLIOGRAPHICAL.

A STUDY OF THE HISTOLOGICAL CHARACTERS OF THE PERIOSTEUM AND PERIDENTAL MEMBRANE. By G. V. BLACK, M.D., D.D.S., professor of pathology in the Chicago College of Dental Surgery. With 67 original illustrations. Octavo, pp. 129 and index. Chicago: W. T. Keener, 1887.

This book is a reproduction of a series of articles originally published in the *Dental Review*. Dr. Black has wisely elected to secure a more permanent form and a larger circle of readers than were afforded in the pages of that journal.

The modest title of the book gives no indication of the extent of the range covered. It should read, "A Study in the Periosteum and Peridental Membrane and all that *directly* relates to them, including Embryology, Histology, and Pathology." That Dr. Black should find material sufficient even with this extended field for a volume is evidence of the exhaustive character of the work done. The sixty-seven original illustrations placed in the front part of the book are well executed, and show much care in the original drawings. The next twenty pages are given to the consideration of tissue-elements and their distribution, followed by twenty pages on the periosteum. The author then digresses for twenty-five pages to take up the development of bone; after which the peridental membrane receives intelligent and full consideration at his hands. Further space is given to osteoblasts and alveolar wall, cement and cementoblasts, closing with a chapter on exostosis and resorptions which occur in the alveolus.

The book as a whole should find hearty reception at the hands of the dental profession, seeking as it is at the present time for some explanation for the methods of retention of replanted and transplanted teeth. It forms one of the most concise manuals on the histology of that subject; and while we do not coincide with the author regarding his explanation of the manner of attachment of transplanted teeth, and as to some other minor points, yet on the whole the book pleased us greatly. We wish for the author all the success to which his ability and years of research entitle him.

W. X. S.

NITROUS OXIDE: Its Properties, Methods of Administration, and Effects. By S. H. GUILFORD, A.M., D.D.S., professor of operative and prosthetic dentistry at the Philadelphia Dental College. Price, cloth, \$1.00.

This little manual of ninety-four pages is devoted, as expressed in

the title, to a consideration of nitrous oxide,—its history, chemical properties, physiological action, relative safety, special cases, manufacture, inhalers and accessories, administration, extraction during anesthesia, accidents and emergencies, combination of other anesthetics with nitrous oxide, and legal considerations concerning its administration.

The author has treated the subject in a practical manner, and the directions regarding the employment of nitrous-oxide gas are concise, and cover all the essential points. There are many practitioners who are daily administering the gas for the production of anesthesia who would do well to avail themselves of the information contained in this manual.

**THE DENTIST'S MANUAL OF SPECIAL CHEMISTRY.** By CLIFFORD MITCHELL, A.B. Harv., M.D. (The Dental College Series of Text-Books.) Small octavo, pp. 251 and index. Price, cloth, \$2.25. Chicago: Published by the author, 1887.

This little volume of 250 pages is a compendium of such chemical facts as have a special application to dentistry. It presents a large mass of information in a concise form, and arranged in an accessible manner. The work contains, besides a general consideration of chemical principles, chapters on the elements, their characteristics and principal compounds; metallurgy, alloys, amalgams, cements, artificial teeth, gum-materials, etc.; organic compounds, including hydro-carbons, essential oils, gutta-percha, caoutchouc, glycerin, alcohols, carbolic acid, creasote, fats, waxes, etc.; the vegetable alkalis, proteids, ferments, germicides, etc.; chemistry of the teeth, saliva and salivary calculi, with their analyses; laboratory and analytical work by the blowpipe and humid methods on the metals and compounds used in dentistry, alloys, amalgams, cements, dental rubbers, etc., and methods for the analysis of teeth, saliva, salivary calculi, and the urine.

The volume will commend itself to the student and practitioner by reason of the special character of the work, the wide field covered, and the studious application of the principles of chemistry to the dental facts which have their explanation in or are founded upon chemistry. It is unique, as being the first effort of the kind in dental literature; and while it might be wished that in several instances the author had not so nearly sacrificed clearness of elucidation to brevity of expression, or in others emphasized the "why" rather than the "how," thus relieving some portions of the flavor of empiricism, at times suggested, the thanks of the dental profession are undoubtedly due to the author for the succinct and orderly presentation which he has given them of an elaborate mass of chemical facts



with their special application which are by no other means readily obtainable.

The book should be in the possession of every student and practitioner of dentistry, as it will undoubtedly do much towards realizing the hope expressed by the author "that it shall stimulate investigation of the special chemistry of dentistry by dentists," and bring to them a fuller and scientific understanding of the great mass of chemical facts with which they constantly have to deal.

E. C. K.

**A LABORATORY MANUAL OF CHEMISTRY**, Medical and Pharmaceutical. Containing Experiments and Practical Lessons in Inorganic Synthetical Work, Formulæ for over Three Hundred Preparations, etc. By OSCAR OLDBERG, Pharm. D., professor of pharmacy and director of the Pharmaceutical Laboratories in the Illinois College of Pharmacy—Northwestern University; and JOHN H. LONG, S.C.D., professor of chemistry and director of the Chemical Laboratories of the Chicago Medical College and the Illinois College of Pharmacy—Northwestern University. With original illustrations. Large octavo, pp. 420 and index. Chicago: W. T. Keener, 1887.

As its name indicates, this book is a working manual for the pharmaceutical chemist and a laboratory guide for the student of pharmacy. The scheme adopted by the authors of dividing the subject into, first, a section devoted to a study of the elements, with appropriate illustrative experiments; second, a section on synthetical chemistry, embracing detailed descriptions of the methods for making the officinal medicinal preparations, with full explanatory notes; and, third, a section on analytical chemistry, giving a sufficiently full system for the detection and assay of the various elements and compounds treated of, renders the work particularly valuable to the student.

A noticeable feature of great excellence is the number of tables throughout the book giving the saturating power of the principal acids and alkalies, tables of solubility of various substances, etc., furnishing a large amount of information valuable alike to the laboratory worker and dispensing pharmacist.

A satisfactory outline of the methods used for analysis of the urine is also given.

The appendix contains a list of chemicals and apparatus necessary for the practical study of the work; also, tables of specific gravities, comparative thermometric values, approximate solubilities, weights and measures, etc. Taken as a whole, the work is a masterly treatise, admirably adapted to the purpose for which it was written.

E. C. K.

**DENTAL CARIES, AND THE PREVENTION OF DENTAL CARIES.** A Series of Papers reprinted from the "Journal of the British Dental Association." By HENRY SEWILL, M.R.C.S. and L.D.S. Eng. Second edition, 12mo, pp. 93. London: Baillière, Tindal & Cox, 1888.

The first edition of this book was reviewed at considerable length in the DENTAL COSMOS for January, 1885. In this second edition the author says, "With the exceptions of a few additions, alterations, and corrections, the text remains unchanged." In view of this statement, it seems hardly necessary to repeat the criticisms of our previous notice. Our author says that the best rough test of the value of a scientific writer is the literary test. Judged by this standard, the scientific value of the work before us could not be rated very high.

**RECTAL AND ANAL SURGERY,** with a Description of the Secret Methods of the Itinerants. By EDMUND ANDREWS, M.D., LL.D., professor of clinical surgery in the Chicago Medical College, etc.; and E. WYLLYS ANDREWS, A.M., M.D., adjunct professor of clinical surgery in the Chicago Medical College, etc. With original illustrations. Octavo, pp. 106 and index. Chicago: W. T. Keener, 1888.

The object of the author is thus expressed in the preface: "A work of the size of this cannot, of course, be an exhaustive treatise on the etiology, pathology, and other scientific aspects of rectal diseases. We have simply aimed to produce a compact manual, sufficient to guide the general practitioner in the most approved treatment of all the more common rectal and anal affections." Within the limits which he has allotted to himself he has succeeded, to a creditable extent, in accomplishing his object.

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## OBITUARY.

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### DR. J. P. PORTER.

DIED, at Napa City, California, October 4, 1887, DR. J. P. PORTER, in the sixty-fifth year of his age.

Dr. Porter was for many years a resident and practicing dentist at Dubuque, Iowa. He became well known to the dentists of Iowa, Illinois, and Nebraska, and removed from Omaha, in the latter State, to California in 1882.

Dr. Porter had enjoyed good health until last winter, when a complication of stomach and liver troubles combined to prostrate him and eventually cause his death. He originated a number of devices in dentistry, which he freely gave to the profession. He leaves a wife and four sons, the latter all being now engaged in dental practice.

## PUBLISHER'S NOTICE.

## THE DENTAL COSMOS FOR 1888.

WE are justly proud of the reputation and the circulation of the DENTAL COSMOS, and we are earnestly desirous of increasing its usefulness as well as its subscription list. In view of our more than a quarter of a century of persistent and consistent effort to help in the steady advance of dentistry, we can justly claim that our ambition is not alone for mercenary ends. We feel a legitimate and honest pride in the conviction that the mission of the DENTAL COSMOS is not merely nor chiefly to promote the business of its publisher, but to focus the light of study, research, observation, and experience on the theories and methods of dental practitioners; to reflect the best thought and best practice of the best men of the times; to help each reader to do creditably for himself and beneficially for his patients the work devolving on him as a member of an honorable and honored profession.

Disclaiming merely selfish objects in its publication, we appeal not alone to selfish motives in urging every practitioner of dentistry to avail himself of the benefits to be obtained from its pages. For, though we believe that the subscription price can be realized by any dentist out of any single number of the volume, yet the pecuniary gain is but a small part of the advantages to be reaped from its perusal. It is the ability to do better service for those who trust themselves in his hands which should be esteemed beyond the more sordid consideration of larger fees; though heightened reputation and increasing patronage will be sure to follow.

Believing, therefore, that in every way the DENTAL COSMOS is accomplishing good alike for publisher and reader, we glory in its success, and labor to increase its benefits by still further extending its circulation, and we cordially invite dentists everywhere to strengthen our hands by their support, and thus help in the good work which they and we are laboring to accomplish.

**See Blank for Subscription at end of reading matter.**

THE S. S. WHITE DENTAL MFG. CO.



## HINTS AND QUERIES.

I WOULD like to know what is the best treatment for receding gums. From appearances the cause is an injudicious use of the tooth-brush. In one case now under treatment the gum has receded from both the inferior and the superior cuspids as much as one-eighth of an inch.—N. C.

REPLY to A. A. H., Hints and Queries, DENTAL COSMOS for August: The best material for taking the impression is plaster, used moderately stiff. The only way to get an impression from which a satisfactory plate may be made is to have the soft roll of gum forced well back under the alveolar ridge. This may be done in taking the impression by using some little pressure horizontally backward.

If the plaster is pressed perpendicularly upward the roll will be forced forward and upward, making it impossible to get a perfect impression of one of the most essential parts,—namely, the rigid surface above the flabby roll. A great many impressions are ruined by the patient moving the head or the dentist letting go of the tray with one hand and taking hold with the other while the plaster is setting. The tray should be held very firmly, and the pressure increased as the plaster hardens. In constructing the denture, it is very important that the six front teeth should not quite touch the antagonizing teeth, or if they do that the upper teeth should be of short bite, and the occluding surfaces ground concave, so that the tendency may be to hold the upper plate back rather than push it forward.—G. O. SHAFER, Champaign, Ill.

IMPLANTATION.—In reply to A. W. S., in the November number of the DENTAL COSMOS, permit me to state that implantation was first practiced by Dr. Mitscherlich, of Germany, and that M. Witzel and Prof. Sauer had performed the operation of implantation prior to August, 1881, and that they are reported as having so stated at a meeting of the Central Association of Dentists in Germany, at Heidelberg, August 2, 1881, in the *Vierteljahrsschrift für Zahnheilkunde*, Volume XXI, No. 4, for October, 1881, pp. 417-419. An English translation will be found in *The Dental Review*, Volume I, No. 9, for July, 1885, pp. 475-76.—LOUIS OTTOFFY, D.D.S., Chicago, Ill.

### TO THE EDITOR OF THE DENTAL COSMOS:

DEAR DR. WHITE: In response to your inquiry as to the condition of the tooth—a right superior second bicuspid—implanted in your presence, by Dr. Younger, in my office, a year ago, I have to report that I examined the case a few days since, and the result is in the highest degree satisfactory. The tooth is firm, and answers all the requirements of a normal dental organ.

There is a slight denudation of the gum-tissue upon the labial aspect of the root near the line of the normal gum-margin. This was caused by a perforation of the gum by the trephine at that point, at the time of the operation, but it has not increased in extent since a month after the operation was done. A slight cavity of decay had formed upon the mesial aspect of the tooth, and this I have filled with gold.

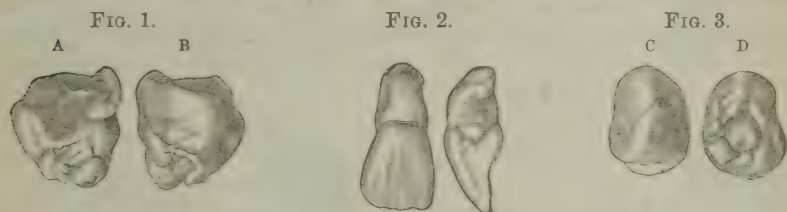
It may be of interest to you to know that the operations which I have performed since then—about twelve in all—are uniformly successful, with the exception of one case, which I have lost by absorption of the root, and in which the tooth never became firm,—owing, I think, to the fact that the patient was in

a condition of lowered vitality, due to the excesses of a fast life, and the nutritive processes consequently were below par.

Aside from this case, the results of my experience in Dr. Younger's operation have been most gratifying.—EDWARD C. KIRK, Philadelphia, Pa., October 31, 1887.

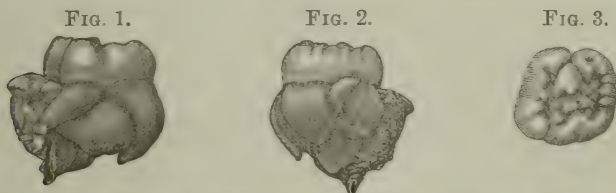
**DENTAL ANOMALIES.**—The remarkably abnormal teeth here illustrated were extracted from a young man aged nineteen, and occupied the usual positions of the superior central incisors. There had been nothing unusual in the eruption or shedding of the corresponding deciduous teeth. There was a normal central imbedded in the alveolus and gum in front of the larger specimen, Fig. 1, but after extracting that one there was not enough process left to retain the short-rooted central, Fig. 2, which was therefore also extracted. The other central had not been developed, unless in the form of one of these anomalies. In this case there must have been at least one supernumerary, as all of the other permanent teeth were present in place and well formed.

The teeth here shown made their appearance at the age of thirteen, and advanced so slowly that at the time of their extraction they would not have been



seen by a casual observer. The surrounding alveolar ridge very much resembled that usually seen about the molars. The larger specimen, Fig. 1, had probably been dead for more than a year, as there had been a fistulous opening through the process and gum for that length of time. The cut A, Fig. 1, represents the palatal aspect, and B the labial appearance, of this abnormal right central incisor. In Fig. 3, C is a palatal and D a labial presentation of the anomalous left central incisor; but no engraving can impart a clear idea of the remarkable peculiarities of form and character shown by these specimens of diverted and arrested dental development.—G. O. SHAFFER, Champaign, Ill.

**DENTAL HYPEROSTOSIS.**—This extraordinary specimen was taken from the mouth of a young woman about twenty-two years of age. The left side of her face was much swollen, and the tooth was extracted with great difficulty, by Dr. Charles Walrad, while she was under the influence of nitrous-oxide gas.



The rest of the teeth were in fair condition, with no evidence of other abnormality. The tooth is the lower left third molar, and it is free from caries. Its disto-lingual aspect is represented in Fig. 1, and a buccal view is afforded in Fig.

2. The coronal surface exhibits a curious resemblance to the face of an old man, with a considerable swelling of the lower jaw on the right side, as is seen in Fig.
  3. The specimen will be given to Prof. Frank Abbott for scientific analysis.—
- THOMAS H. MUSGROVE, Philadelphia, Pa.

**DEVITALIZING NERVE-FIBER.**—It often happens that a very useful article for the dentist and a beneficial one for the patient is known to comparatively few practitioners, and so I find many who are not aware of the prompt and painless action upon an exposed pulp of the White Company's nerve-fiber, which, when placed gently yet exactly in contact with the pulp, and without pressure carefully sealed tight in the cavity with a pledget of cotton saturated with thick sandarac varnish, will in twenty-four hours destroy the pulp effectively, and with the least possible discomfort or annoyance to the patient. Only a few fibers are necessary, and these should be rolled compactly on the flat, smooth end of a nerve instrument made for the purpose, so that the little pin-head-sized ball may with the pliers be placed precisely and painlessly in position, covered with a little fluff of dry cotton, and sealed in any suitable way without pressure.—A. J. T.

**CELLULOID BLANKS FOR COUNTER-SUNK TEETH.**—Dr. M. H. Cryer devised the filing of notches in celluloid blanks as in Fig. 1, when the counter-sunk tooth-crowns are to be mounted in this material. The suggestion is a practical one,

FIG. 1.

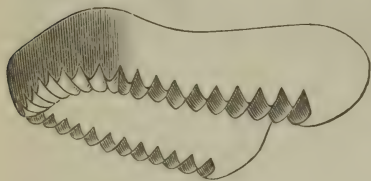


FIG. 2.

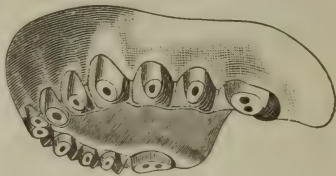
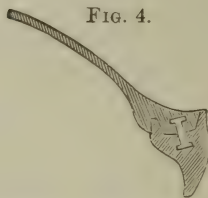


FIG. 3.



FIG. 4.



and obviates the defects which I have found to attend the mounting of these teeth in the usual way, for the confined air in the cups commonly prevents the celluloid from entering far enough to more than half fill them, and thus the pins are left untouched. As a consequence one is disagreeably surprised by the teeth coming off in the process of finishing; or, what is worse, by the return of the patient with one or more detached teeth in the hand. This has not occurred since trying Dr. Cryer's method, and an experimental case from which the teeth were purposely broken showed all the cups or countersinks perfectly filled, as seen in the cut, Fig. 2, copied from that case. That was a demonstration of the effectiveness of the plan which provides for the escape of the air, while the plastic promontories enter the countersinks and surround the pins, by means of which the teeth are firmly secured to the plate, on which they thus have so strong a grip that the labial necks of the crowns may, for conformity to the adjacent natural teeth, be



quite uncovered by the celluloid (see Fig. 3), and the mount be yet a strong one, as is evidenced by the section through plate and crown, Fig. 4. In this instance the short celluloid festoons (see Fig. 3) lie close upon the gun, which they much more nearly resemble than the dark vulcanite.—H. S. W.

**PHOSPHOR NECROSIS.**—The report of a case, by Mr. Hutchinson, of the Clinical Society of London, of necrosis of the jaw from the administration of phosphorus, in the August number of the *DENTAL COSMOS*, and copied from the *Pacific Record*, recalls a case of phosphorous poisoning that came under my care some time since.

The history of the case is as follows: Mr. D., aged 23, presented himself for relief from severe burning pain, and a considerable swelling, which involved principally the masseter and temporal muscles of the right side of the face.

The swelling was hard and tense, and the mouth could be opened to but a limited extent, with a great deal of difficulty. The mouth was dry, but there was no odor to the breath. All of the teeth were in perfect order and condition.

None of the answers to my questions afforded any assignable cause for the patient's present condition, but on general principles I advised a hot flax-seed poultice to be applied continually to the side of the face, until the inflammatory products should begin to soften; then, to remove the poultice, and protect the face with warm, dry flannels. I directed

R.—Potassii iodidi . . . . . grs. v,  
Hydrargyri chlorid. corros. . . . . gr.  $\frac{1}{8}$ ,

to be given every three hours during the day. This treatment, with the exception of  $\frac{1}{4}$  of a grain of morphine sulphatis given at the beginning as an anodyne, was continued for two days, with marked benefit; no pain, no swelling, and but little soreness in the muscles under pressure. Two days more restored the right side of the face to its normal functions and proportions. But three days later I was again called to see the young man, and I found him in bed, with the same old trouble, but somewhat increased in intensity. Temperature 100, pulse 90, skin hot and dry; the breath had an oniony smell, and, as he expressed it, "his mouth tasted as if he had it full of onions."

In answer to my questions, he said that he did not know what brought it back upon him; neither had he been eating any onions; but in some accidental way I now learned that he had been in the habit, for some time past, of chewing matches and blowing the smoke out of his mouth, just for pastime.

I did not look further for the cause of his trouble, but ordered the match-chewing stopped, and prescribed single-drop doses of aconite every hour during the day, directing the re-application of the flax-seed poultice, the internal treatment as before, and effected the desired good result in three days' time. As the swelling subsided this time there were two points, one at the angle and the other at the middle of the body of the jaw, that were very sore and painful to the touch, thus showing the condition of the periosteum at those points. But the sensitiveness passed away with no more trouble. I think this was a case which, if it had been allowed to run its course, would surely have developed at the two above-mentioned points necrosis caused by phosphorus, without the presence of carious teeth to be charged with the lesion.—JOHN L. GISH, M.D., D.D.S., Jackson, Mich.

**AN ARTIFICIAL TOOTH-CROWN ON A LEADEN ROOT** was recently implanted in a socket artificially formed in the jaw of a Chinaman, by Dr. S. M. Harris, of Grass Valley, California. A porcelain crown was fixed on a platinum post, and

around this lead was melted in a mold to resemble a tooth-root, and was slightly roughened to afford a retaining hold for the new tissues in the socket after the ligatures should be removed. The operation is said to be original with Dr. Harris, who reports the case as at this date doing well.—*Grass Valley Union*.

THE SPYER SURFACE COHESION FORM should be first well fitted to the model; then removed and brushed over on the under side with soft mixed plaster, to fill all the little depressions. The form is to be at once replaced on the model, and with gentle finger-pressure quickly and closely adapted to every part of the model, which, if previously dampened, will hold the form firmly in place. The papilliform prominences thus supported will be filled on the other side by the rubber, and, after its vulcanization, stand out perfectly, and act effectively in retaining the plate in the mouth.—E. S. FAWCETT.

TEMPORARY FILLINGS.—There is wanted a simple, cheap preparation, in something like the form of sticks of cement, which will become plastic by heat, and adhere to the walls of the properly dried cavities in which it is to be placed as a temporary filling. Cotton and sandarac varnish stoppings serve the purpose in many cases, but soon become more or less offensive by reason of their porosity, especially when subjected to frequent pressure as in coronal or approximal cavities. Medicaments employed in the treatment of dead teeth and roots, and nerve-fiber for the divitalizing of dental pulps, ought always to be tightly sealed in, so that their action shall be limited to the parts to be curatively or destructively affected. Every dentist of experience has seen a dark blue line at the cervical margin of the cavity in which a devitalizing agent had been imperfectly covered, or its covering had become loosened so that the leakage had resulted in the destruction of the adjacent gum-tissue to a greater or less extent. Such leakage has even occasioned the loss of a large portion of the alveolus, and necessitated a surgical operation for the removal of the resulting sequestrum.

The required filling material need not be of a durable nature, as its uses are to be of a designedly ephemeral character, and this fact should be impressed upon the mind of the patient, lest there should follow the commonly fallacious lay judgment that as the tooth is quite comfortable, and the filling seems to be all right, there is no necessity for keeping the appointment for a renewal of the medication or other treatment.

Not infrequently the tumefied gum overlaps a labio-cervical cavity, so that immediate filling is well-nigh impracticable; but with the proposed material an overflow compress can be packed in the dried cavity and crowd out the gum, and at a subsequent sitting the cavity margin will be found visibly accessible for thorough preparation and a permanent filling.

The hope for a durable plastic filling is still a hope deferred, but the desire for a temporary filling material of the kind here indicated may reasonably be expected to be soon gratified, if some of our experimental experts will give due attention to the subject.—H. S. W.

DENTAL COLLEGES AND STATE EXAMINING BOARDS.—Among the not far remote probabilities is an appeal to the Supreme Court of the United States for a final settlement of some questions that have already arisen in relation to the respective legal functions and provinces of dental examining boards and dental colleges.

Nearly all the States now have statutory enactments and regulations respecting the practice of dentistry, and these laws have been framed in each State inde-

pendently of similar laws in other States, although in some instances there has been an endeavor to maintain something like concordance in form and scope. The full text of these laws has, at various times, been published in the *DENTAL COSMOS*, and in the August number, 1887, there was presented in tabular form a brief analysis of some of the principal features of such laws in thirty-three States.

In Connecticut, Missouri, Nebraska, New York, and Ohio there are no examining boards, but the possession of the diploma of a dental college located in any State is deemed a sufficient answer to the requirements of the law. Suppose, however,—as has already been the case,—a State should limit the legal formula to graduates from colleges within its own borders, and licensees of its own board or society. What recourse has the graduate of an outside college? Suppose, furthermore,—as has already been the fact,—that an examining board should (wisely or not is not at present in the discussion) discredit the diploma of a college, either within or without the State, on the ground that it is not a reputable college. It is easy to see that grave and delicate and complicated questions may thus be started on their way to a conclusive judicial determination in the court of last resort.

In the hope that all immediately concerned in the promotion of equity, and in the best interests of the profession and the public, will do whatever they can to produce harmony in, and reduce friction between, the colleges and the boards, attention is directed to the subject of their inter-dependency, while as yet the signs of a divisive tendency though apparent are not irremediable.

Whether members of college faculties or trustees should be also members of State boards is a matter for most careful consideration.—W. O. H.

TO THE EDITOR OF THE *DENTAL COSMOS*:

In looking over an old paper of October 16, 1818, I saw the following advertisement, and copy it as showing the style at that time.—F. H. HAYES, Dover, N. H.

*New Advertisement.*

Teeth fil'd and teeth sawn,  
Teeth set and teeth drawn,  
Teeth clean'd in style genteel,  
At Stephen Pattens, by Dr. Steele.

DOVER, N. H., Oct. 16, 1818.

## THE INTERNATIONAL TOOTH-CROWN COMPANY'S SUITS.

IN view of the numerous requests for information from dentists as to the status of the International Tooth-Crown Company's suits, a request was made of Messrs. Gordon and Beach to state the case succinctly, and the following reply has been received, which it is thought should be published in the *DENTAL COSMOS*.

W. W. WALKER,

*President First District Dental Society, State of New York.*

NOVEMBER 1, 1887.

A. L. Northrop, D.D.S.:

DEAR SIR: In answer to your request on behalf of the First District Dental Society of the State of New York, asking for our opinion as to the legal position of the dental profession with regard to the crown and bridge patents of the "International Tooth-Crown Company," in view of the recent decision of Judges



Wallace and Shipman, in the Richmond and Gaylord suits, and advice as to relief from further claims made under the Low bridge patent, we have to say:

These suits involved the validity of the two patents to Cassius M. Richmond, Nos. 277,941 and 277,943, for "tooth-crowns, etc.," the patent to Alvan S. Richmond, No. 277,933, for "bridge," all dated May 22, 1883, and the patent to James E. Low, for "method of supporting artificial teeth by bands cemented to permanent teeth," No. 238,940, dated March 15, 1881.

The first two patents covered what is known as the "Richmond" and the "Sheffield" tooth-crown in all its varieties. They were held invalid, and therefore you are at liberty to make such tooth-crowns without being in any way liable to the International Tooth-Crown Company.

The complainants have appealed this case to the U. S. Supreme Court, but we do not advise you that any different decision will probably result. The practical result is that the tooth-crown is free.

The patent for the Richmond bridge was also held invalid, but the Low patent was declared to be good. This Low patent covers a bridge attached to continuous bands cemented to adjoining permanent teeth, "whereby said artificial teeth are supported by said permanent teeth without dependence on the gum beneath."

The Richmond patent is, as you will remember, for a bridge supported by caps, and the court held that it was not invention for Richmond to support a bridge on caps, but it was invention for Low to support a bridge on bands, taking all the surrounding circumstances into consideration, and that, as a cap was nothing but a band with a roof on it, the Richmond bridge infringed the Low patent.

The practical effect of this decision, if the complainant chooses to follow it up diligently, and unless some new evidence is found, will be to shut the profession out from inserting permanent bridges supported at one or more points by cemented caps or bands without dependence on the gum.

As the matter now stands, any dentist inserting a Richmond bridge (according to the decision) infringes the Low patent; and an injunction would doubtless now be granted by any Federal judge on application, on the strength of that adjudication alone.

An appeal can be taken by the defendants to the Supreme Court, a year or so hence, after an accounting by them, and determining the amount of profits or damages the complainant is entitled to recover.

The way of relief is for all the dentists of the United States, who supported artificial teeth on a band or bar, surrounding and extending between permanent teeth, prior to September, 1878, to send to us at No. 833 Broadway, New York City, or to No. 9 Law Chambers, New Haven, Connecticut, a truthful description of what he did, and for whom, and where and when.

If such proofs can be made strong and clear enough to satisfy the court that what Low described was well known, and had been long practiced by dentists in the United States before Low claims to have done it, the present case might be opened for re-hearing on the newly-discovered evidence—or the courts might refuse to grant injunctions, upon the ground that the present decision would have been the other way if this evidence had been before it. At any rate, the question of the validity of the Low patent would be re-tried, if its owner ever had the temerity to sue a dentist whose mouth had not been closed by a license, in which he covenanted never to deny its validity.

Whether, in a suit against such a licensee, the court would enjoin upon the covenants, under a patent declared void, either before or after the taking of the license, we cannot say.

Your obedient servants,

SOLOMON J. GORDON, 833 Broadway, New York City.

JOHN K. BEACH, 9 Law Chambers, New Haven, Conn.

# SLIP-JOINT, WITH DUPLEX-SPRING CONNECTION

## FOR DENTAL ENGINES.

### SLIP-JOINT.

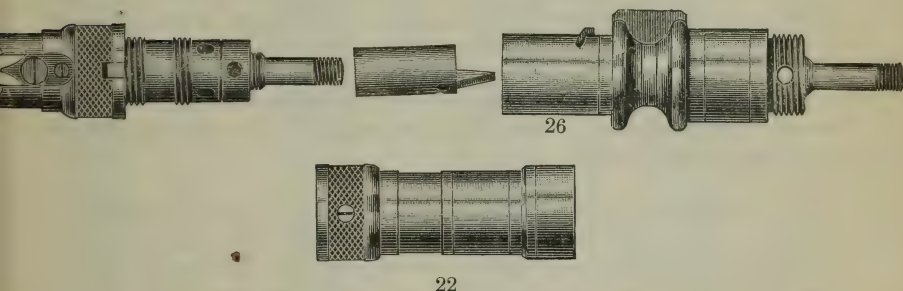
Patented September 29, 1885.

A Dental Engine Hand-piece, in proper condition for delicate manipulation, is necessarily very accurately adjusted. To keep it in perfect condition it must be exempted from the heavy work of grinding and polishing, which will do more in a half hour to derange the fine adjustments than a week's use in excavating dentine. A Hand-piece too much worn to be useful in the finer operations may be perfectly good for coarse work. Heretofore the use of two Hand-pieces involved procuring an extra cable, sheath, and pulley-head for the S. S. White Engine, or an extra arm and head for the Johnston and Shaw machines.

How to avoid this difficulty and permit the dentist to use a partly-worn Hand-piece for work not requiring fine adjustment, while his new one was reserved for delicate work, has been a problem which we are happy to say has been solved. We have devised a Slip-Joint Connection to attach the Hand-piece to the Engine-arm, with which a dentist who has two or three Hand-pieces of the same pattern can substitute one for the other almost instantly,—actually in less time than is occupied in changing a bur in a Hand-piece; or, different styles of Hand-pieces can be utilized on the same Engine by the use of an additional Connection; or, if he has two or three styles of Engines and desires to use the same Hand-piece on all of them, the Slip-Joint Connection will enable him to do so.

The Connection is shown in sections in Fig. 1, as adapted for the No. 6 Hand-piece.

Fig. 1.



We also supply it for the No. 7 Hand-piece, and it is applicable to the S. S. White, Johnston, and Shaw Engines. One Slip-Joint will not answer for all, as each Hand-piece requires an additional ferrule and dog, the cost of which is comparatively trifling. (See Fig. 6).

Not the least important of the uses of this Slip-Joint is the improvement

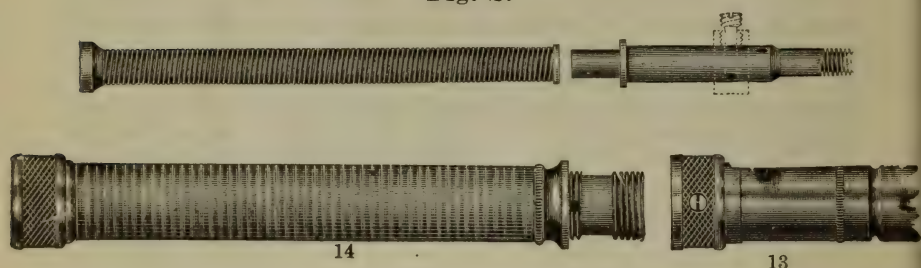
it permits in the Angle Attachments, which it virtually transforms into Angle Hand-pieces (Fig. 7). The stem or handle is enlarged to provide a place of support for the thumb in line with the cutting tool; the new appliance is more readily attached than the old, and the distance from the engine-arm to the working point is no greater than in the regular Hand-piece. Being more thoroughly under the control of the operator, the Angle Hand-pieces will prove to be more efficient than the Angle Attachments heretofore used.

## DUPLEX DRIVING-SPRING.

Patented March 22, 1887.

The desideratum of all Dental Engines is the highest possible degree of torsional strength in their flexible shafts and connections. Any lack in this direction will cause unsteadiness in the rotation of the cutting tool. We have recently

**Fig. 2.**



devised a Duplex Driving-Spring (Fig. 2) which gives almost perfect flexibility at what may be called the wrist-joint of the Hand-Piece, and at the same time steadies the motion of the bit. But for its brass end it would be scarcely distinguishable from the well-known Johnston Engine Driving-Spring, but it will be found to have many times the torsional strength of that appliance. When connected to the Hand-piece it has bearings at both ends, thus releasing it from pulling strain when in use.

The Duplex Driving-Spring and the Slip-Joint Connection are two of the most important improvements ever made in the Dental Engine. Combined they add largely to the convenience and utility of the Engine. To insure proper adjustment we prefer to sell the Hand-piece with Slip-Joint and Duplex-Spring Connection complete, ready to attach to the Engine-arm. They can, however, be had without the Hand-piece, either separately or combined, in which case care must be exercised in attaching them by complying strictly with the directions sent. Whether ordered with or without the Hand-piece, we will need to know to what Hand-piece and Engine they are to be attached, so that we can supply the proper Connections.



# Slip-Joint and Duplex-Spring Connection

## FOR DENTAL ENGINES.

**Fig. 3.**



**Cone-Journal Hand-Piece No. 6 for Slip-Joint.**

Patented Nov. 16, 1875; March, 25, 1879; Oct. 26, 1880; Oct. 30, 1883. Reissues March 11, 1879; Nov. 4, 1879.



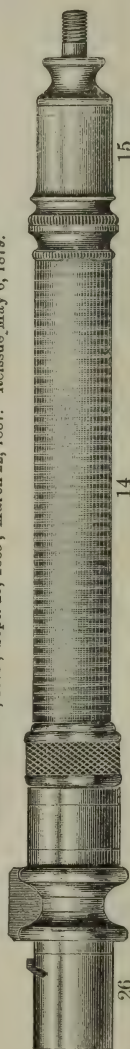
**Clutch Hand-Piece No. 7 for Slip-Joint.**

Patented March 16, 1875; Oct. 30, 1883; Jan. 8, 1884. Reissues March 11, 1879; Nov. 4, 1879; May 16, 1882.



**Slip-Joint, with Duplex-Spring Connection for S. S. White Engine.**

Patented June 4, 1878; Sept. 29, 1885; March 22, 1887. Reissue May 6, 1879.



**Slip-Joint, with Duplex-Spring Connection for Johnston and Shaw Engines.**

Patented Sept. 29, 1885; March 22, 1887.

## PRICES.

Hand-piece No. 6 or No. 7, with Slip-Joint and Duplex-Spring Connection, for the S. S. White Engine . . . . .	\$21.50
Hand-piece No. 6 or No. 7, with Slip-Joint and Duplex-Spring Connection, for the Shaw Engine . . . . .	21.50
Hand-piece No. 6 or No. 7, with Slip-Joint and Duplex-Spring Connection and New Socketed Extension Arm, for the Johnston Engine . . . . .	23.00
Slip-Joint, separately . . . . .	7.50
Duplex-Spring Connection, separately . . . . .	4.00

The Duplex-Spring Connection can be supplied without the Slip-Joint at the following prices :

Hand-piece No. 6 or No. 7, with Duplex-Spring Connection, for the S. S. White Engine . . . . .	\$14.00
Hand-piece No. 6 or No. 7, with Duplex-Spring Connection, for the Shaw Engine . . . . .	14.00
Hand-piece No. 6 or No. 7, with Duplex-Spring Connection and New Socketed Extension Arm, for the Johnston Engine . . . . .	15.50

A screw-socket on the end of the cable or Engine-arm is necessary for the application of the Slip-Joint and Duplex-Spring Connection. All S. S. White Engine-arms adapted for the No. 6 and No. 7 Hand-pieces have this socket; the Shaw Engine-arm is also socketed; but the Johnston Engine will have to be supplied with a socketed arm, as those now used on that Engine cannot be adapted to this Connection. Fig. 4 shows the Screw-socket of the S. S. White Engine-arm, and Fig. 5 a portion of the new Johnston arm required.

**Fig. 4.**



Patent October 30, 1883.

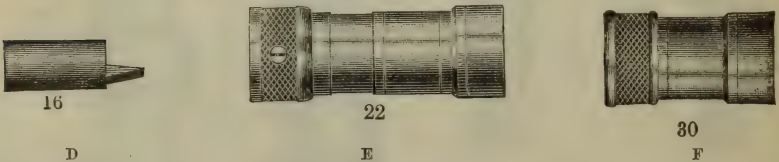
**Fig. 5.**



Price of Screw-End Socket for S. S. White Engine (Fig. 4) . . . . .	\$0.40
“ Socketed Arm for Johnston Engine (Fig. 5) . . . . .	1.50

If it is desired to use more than one Hand-piece with the same Engine, each must be fitted with a ferrule and coupling-dog, as shown in Fig. 6.

**Fig. 6.**



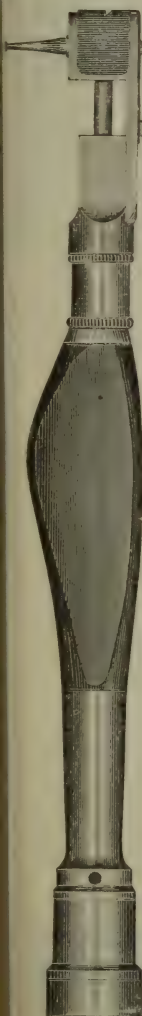
No. 6 Hand-piece requires D and E. Price, . . . . .	\$1.50
No. 7 Hand-piece requires D and F. Price, . . . . .	1.50

Other forms of Hand-pieces require different Connections, which have to be made to order.

# ANGLE HAND-PIECES,

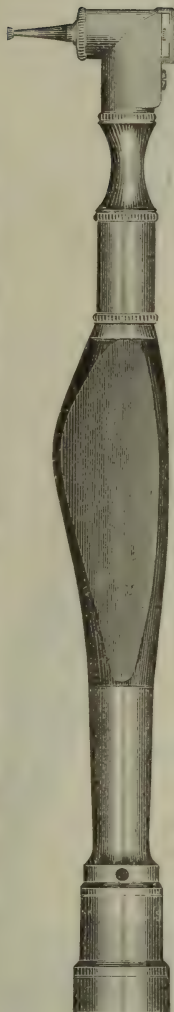
Fitted for the Slip-Joint Connections.

Fig. 7.



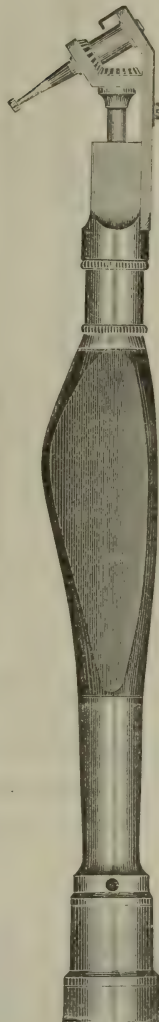
**No. 1 Right-Angle Hand-Piece for Slip-Joint Connection.**

Patented Dec. 5, 1876; Jan. 23, 1877 (No. 186,471 and No. 186,504); others pending. Reissue Nov. 2, 1880.



**No. 2 Right-Angle Hand-Piece for Slip-Joint Connection.**

Patents pending.



**Acute-Angle Hand-Piece for Slip-Joint Connection.**

Patented Dec. 5, 1876; Jan. 23, 1877 (No. 186,471 and No. 186,504); others pending. Reissue Nov. 2, 1880.



**Obtuse-Angle Hand-Piece for Slip-Joint Connection.**

Patented Dec. 5, 1876; Jan. 23, 1877 (No. 186,471 and No. 186,504); others pending. Reissue Nov. 2, 1880.

Price

each \$7.00



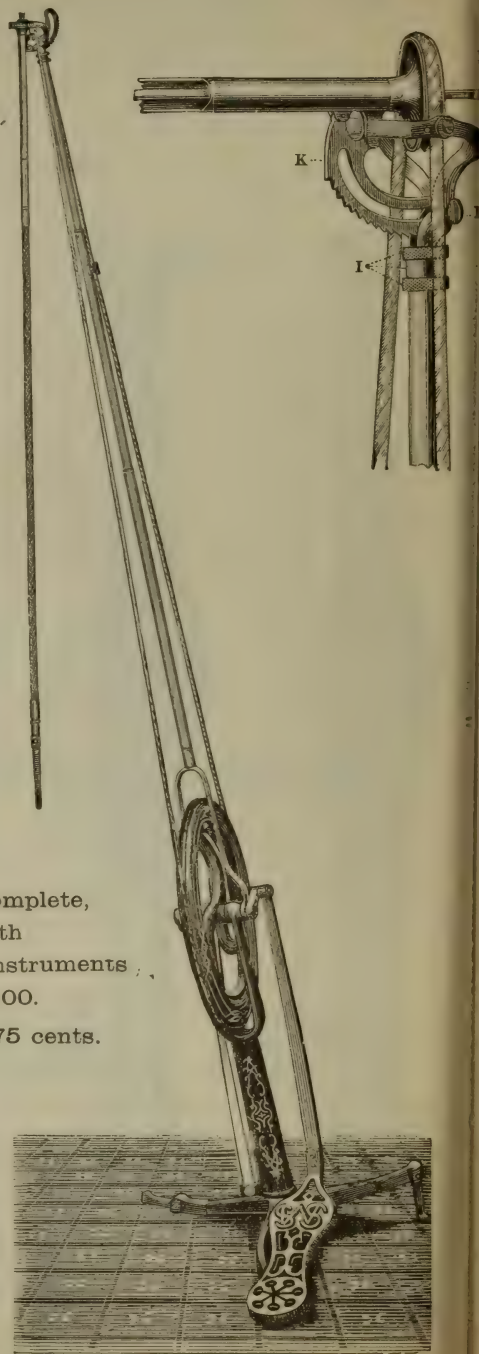
# The S. S. White Improved Dental Engine.

"A."

FIG. 1.

FIG. 2.

FIG. 3.



Price, complete,  
with  
Fourteen Instruments,  
\$50.00.  
Boxing, 75 cents.

The Driving-Wheel of the "A" Engine is  $10\frac{3}{4}$  in. diam., and weighs 9 pounds.

# The S. S. White Improved Dental Engine.

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Patented Aug. 4, 1874; Sept. 2, 1879; July 6, 1880. English Patent Aug. 13, 1879.

Reissues, Nov. 12, 1872; Jan. 2, 1877; March 4, 1879; March 11,  
1879; Nov. 4, 1879.

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There are now three styles of the S. S. White Dental Engine, classified according to the size of the driving-wheel. The regular style will hereafter be known as "A." The Large-Wheel Engine (see page 9, two sizes) will be designated as "B" and "C."

The Engine, as first put upon the market, was thus characterized by an expert in mechanical construction: "A machine which for simplicity, ease in movement, and adaptation excels anything I have ever seen." We have, however, never ceased in our endeavors to improve it. From time to time modifications have been made, after careful tests have proved their value, with the result of markedly increasing its efficiency.

The latest improvement is the Wardwell Pulley and Rubber Rim, by which the power of the Engine is materially increased.

The flexible shaft and sleeve, the foot-power (with spring pitman, by which the crank is thrown above its center), and the rocking-arm have been common to all forms of the Engine.

The rocking motion endows the flexible working-arm with greater extent and increased freedom of motion, and it also practically eradicates all tremor, which in a rigid post Engine would be conveyed not only to the working-arm, hand-piece, and tool, but also to the hand of the operator. The rocking-arm is controlled by a spring of flat steel, screwed to the base on the side opposite to the treadle, its upper portion sliding freely in a roller-buckle which terminates the prolongation of the yoke. The tension of the spring may be varied by loosening or tightening the screw which holds it to the base. The traction of the spring is thus diminished as the rocking-arm is deflected from the perpendicular.

Other important improvements which have been established features of the S. S. White Improved Dental Engine for some years are briefly described below :

The two short feet of the base are provided with hinged toes, by which the entire apparatus may be tilted to either side and yet hold its position firmly on the floor, thus bringing the flexible arm and pulley-head immediately in front of the patient. The treadle being fixed to the base, is also tilted, and presents itself to the operator's foot in such manner that it may be worked with ease and convenience. The driving-wheel of the "A" Engine is  $10\frac{3}{4}$  inches in diameter and weighs about 9 pounds.

The pulley-head is hinged to a pivot-rod, so that it may be moved vertically or laterally at pleasure. It is also provided with a slotted ratchet and spring-pawl, by which the flexible arm may be fixed automatically at various angles.

The tension of the cord is regulated with one hand by raising or lowering the pulley-head in the tubular upright, and securing it by a jam-nut A (Fig. 1).


 The flexible arm, when not in use, should be dropped vertically beside the upright, instead of being allowed to project as in the old-style Engine. This preserves the straightness of the shaft and sleeve and prevents them from becoming "set" in a curve.

Fig. 1 shows the Engine with the flexible arm raised to its usual working position, and the rocking-arm perpendicular.

Fig. 2 shows the angle at which the Engine may be tilted to bring it in front of the patient, with the flexible shaft hanging vertically.

The head-piece (see Fig. 3) consists of a hinged yoke frame, one portion of which is pivoted to the top of the rocking-arm ; the other portion carries the driven pulley and the rigid portion of the working-arm. The segmental ratchet *K*, by which the angle of the working-arm is adjusted, is controlled by the spring-collar *I*. To raise the working-arm only a slight upward movement or toss of the hand holding the head-piece is necessary. To lower it take the head-piece in one hand and with the other pull the spring collar downward, when the arm will drop to its place.

To place the cord on the driven pulley take out the screw-pin *L*, raise the arm until the segmental ratchet is drawn from the yoke, and pass the cord to its place. The pin *L*, it will be observed, passes through the slot in the ratchet, thus limiting the upward adjustment of the working-arm.

**In ordering an Engine always state which hand-piece is wanted. Unless another is specified, we assume that the No. 6 Cone-Journal is desired.**



# THE S. S. WHITE LARGE-WHEEL DENTAL ENGINE.

Two Sizes, "B" and "C."

Patented Aug. 4, 1874; Sept. 2, 1879;  
July 6, 1880. Reissues, Nov. 12,  
1872; Jan. 2, 1877; March 4,  
1879; March 11, 1879; Nov. 4,  
1879. English patent, Aug.  
13, 1879.

The large driving-wheel was introduced in response to requests for an Engine which would give a higher rate of speed than the regular style, as, for instance, in cutting oversensitive dentine or in burnishing fillings. Two sizes are made, distinguished as "B" and "C." The Large-Wheel Engine has the old-style rocking-balance and the improved pulley-head and is built with the Wardwell Pulley and Rubber Rim. The sizes of the driving-wheels are as follows:

B, diam.  $12\frac{7}{8}$  inches; wt.  $8\frac{3}{4}$  lbs.

C, "  $13\frac{1}{2}$  " "  $15\frac{1}{2}$  "

It is believed that sufficient variety, in sizes and weights is offered to meet all requirements. Besides giving a higher rate of speed for emergencies, the larger driving-wheel will do ordinary work with slower movement of the treadle, and consequently less exertion on the part of the operator.

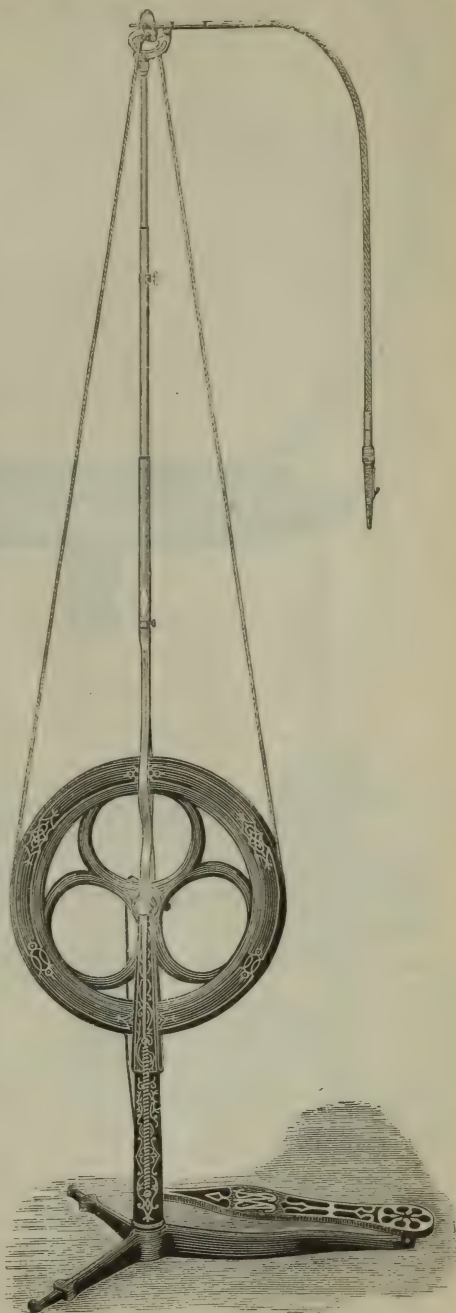
In ordering, please state size of driving-wheel desired.

Price, with either Wheel,

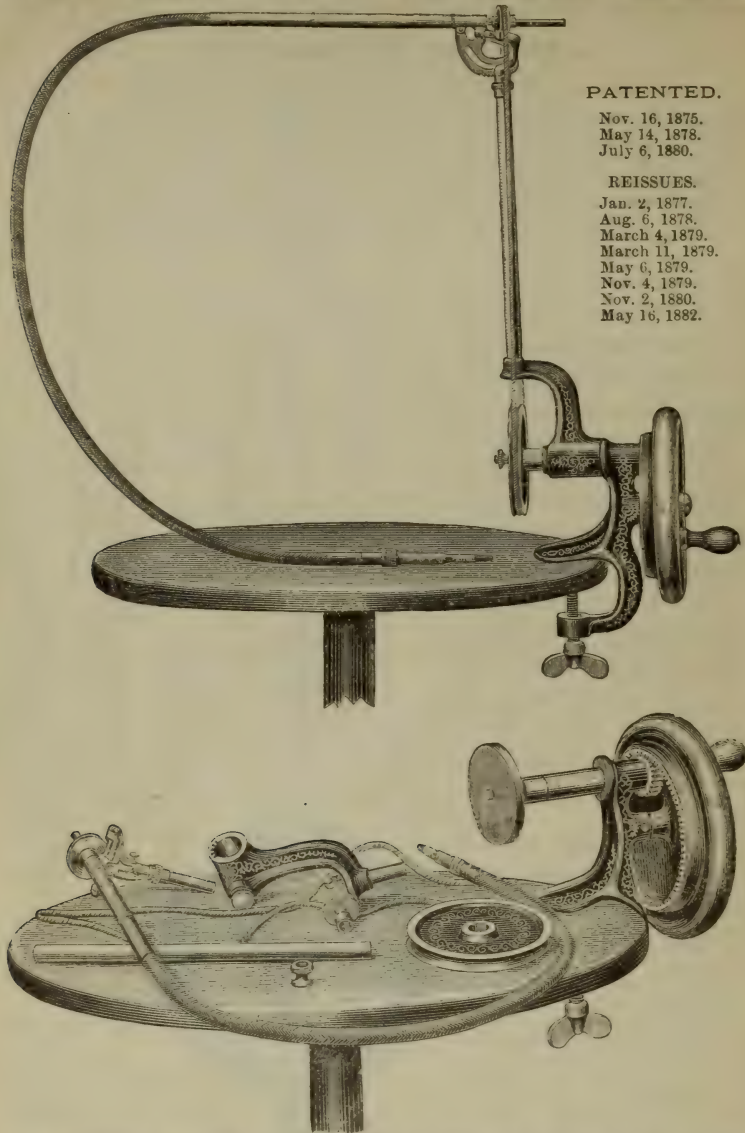
B or C, and Fourteen

Instruments . . . \$55.00

Boxing . . . . .75



# THE S. S. WHITE HAND ENGINE AND LATHE COMBINED.



PATENTED.

Nov. 16, 1875.  
May 14, 1878.  
July 6, 1880.

REISSUES.

Jan. 2, 1877.  
Aug. 6, 1878.  
March 4, 1879.  
March 11, 1879.  
May 6, 1879.  
Nov. 4, 1879.  
Nov. 2, 1880.  
May 16, 1882.

This apparatus, intended primarily for the traveling dentist, or for the use of those who may be called upon to go some distance from their offices to perform small operations, is so made that while it will do the work of both engine and laboratory lathe, it may be taken apart and packed for convenient carrying, its total weight being only five and one-half pounds. With the engine-arm attached the same rate of speed may be attained as with our foot-power engine. We supply with the apparatus, already mounted, without extra charge, one No. 1 and one No. 6 corundum wheel, which can be used for ordinary grinding, or for articulating teeth.

Price, Hand Lathe, with two mounted Corundum Wheels	\$ 4.00
Price, Hand Lathe, with two mounted Corundum Wheels and the complete New-Style Engine-Arm, as shown in cut	29.00
Price, Hand Lathe, with complete Old-Style S. S. White Engine-Arm	24.00

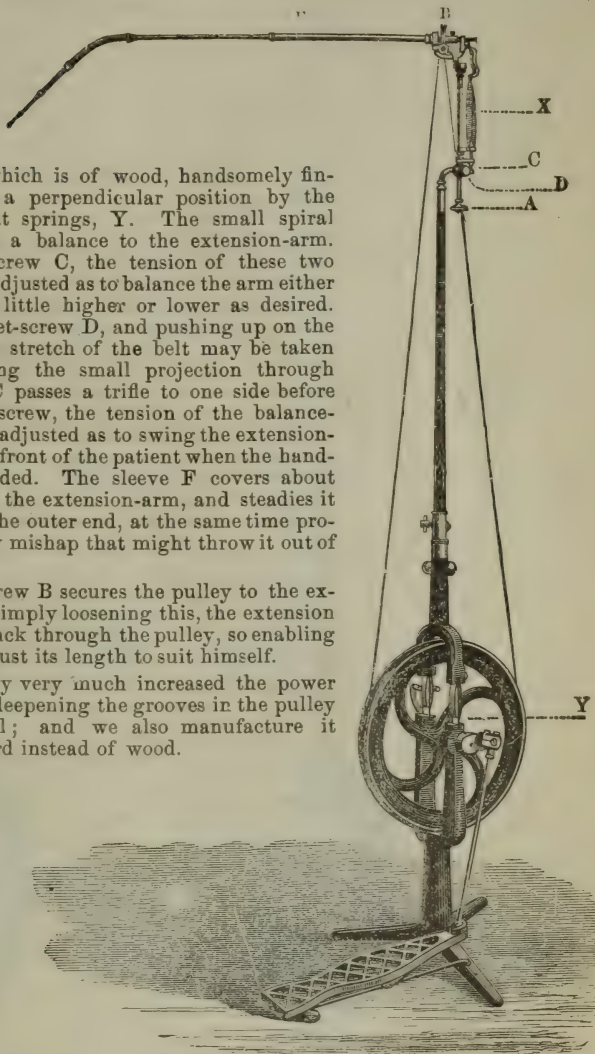
# The Johnston Dental Engine.

Patented July 6, 1880; July 8, 1884. Reissues November 12, 1872; March 11, 1879; November 4, 1879.

The standard, which is of wood, handsomely finished, is held in a perpendicular position by the two compound flat springs, Y. The small spiral springs, X, act as a balance to the extension-arm. By turning the screw C, the tension of these two springs can be so adjusted as to balance the arm either horizontally or a little higher or lower as desired. By loosening the set-screw D, and pushing up on the little knob A, the stretch of the belt may be taken up, and by turning the small projection through which the screw C passes a trifle to one side before tightening the set-screw, the tension of the balance-springs may be so adjusted as to swing the extension-arm away from in front of the patient when the hand-piece is left suspended. The sleeve F covers about half the length of the extension-arm, and steadies it by the journal at the outer end, at the same time protecting it from any mishap that might throw it out of center.

The small set-screw B secures the pulley to the extension-arm. By simply loosening this, the extension arm may be slid back through the pulley, so enabling the operator to adjust its length to suit himself.

We have recently very much increased the power of this Engine by deepening the grooves in the pulley and driving-wheel; and we also manufacture it with metal standard instead of wood.



## PRICES.

Engine, as shown in cut, with Fourteen Instruments	\$40.00
Engine, with Metal Standard and Fourteen Instruments	45.00
Boxing	.75



# The Improved Shaw Dental Engine.

Patent November 1, 1881 ; others pending. Reissues November 12, 1872 ;  
January 2, 1877.

FIG. 1.



FIG. 2.



# The Improved Shaw Dental Engine.

Recognizing the merits of the Parsons Shaw Dental Engine we have purchased the American patents covering its manufacture, and we now offer it as an additional mechanical aid to the dentist. As made by us it is of superior quality in materials and workmanship. We have modified its construction somewhat to secure greater efficiency, and we have no doubt it will be found exactly adapted to the wants of many dentists. It is not put forth as superior to our other Engines, but simply as an additional form, to cover more completely the range of the needs or desires of dental practitioners.

The Shaw Engine is an easy running machine, free from "pull" upon the hand-piece, and the driving-cord can be readily adjusted to give different speeds to the bur, with the same movement of the treadle. A support is provided for the hand-piece, which keeps it always within easy reach (see Fig. 2).

## DESCRIPTION.

A tripod base supports a forked standard carrying a driving-wheel  $12\frac{1}{2}$  inches in diameter. To the rear or long foot of the base is pivoted a plate to which the heel of the treadle is hinged, adapting it to any unevenness of the floor.

The lower end of the pitman extends  $1\frac{1}{2}$  inches below the point to which the treadle is pivoted. To this end is attached a spiral spring extending beneath and connecting with the heel of the treadle. The tension of this spring keeps the crank end of the pitman off center, so that the Engine is started by a slight pressure of the foot of the operator upon the treadle.

To the top of the yoke is attached a standard, 35 inches long, in two sections, the lower of which is fixed, while the upper section telescopes to regulate the tension of the driving-cord and is held in position by a clamp-nut A. Upon the telescoping section of the standard is pivoted a horizontal arm B, through which is journaled a shaft which carries the driven pulley. To the free end of the horizontal arm is attached by compound pivotal joints or hinges a supplemental section or forearm C, through which a second shaft is journaled. The two sections of the driving-shaft are connected by a flexible driving-spring, which is protected by the pivotal joints and works in the same plane with them, thus permitting flexure without varying the length of the arm. The hand-piece is connected to the forearm by a second flexible driving-spring covered by a sheath. Both of the driving-springs are known as duplex springs, *i. e.*, double springs in one section, giving greater power without diminishing the facility of flexure.

The driving-shaft is protected at every point, from the pulley-head to the hand-piece. The pulley is provided with two grooves, by which two widely different speeds may be imparted to the bit.

Either No. 6 or No. 7 Hand-piece will be furnished with this Engine. We send No. 6 unless otherwise ordered.

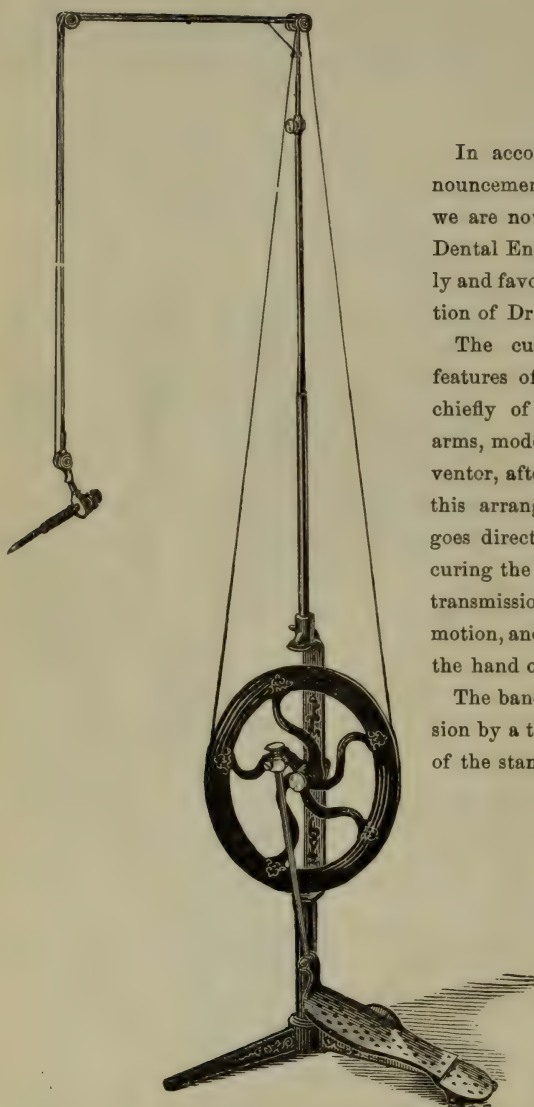
Price, complete, with 14 Instruments . . . . .	\$40.00
Boxing . . . . .	.75

## CAUTION.

Fig. 2 shows the position of the Engine-arm when not in use. The Engine should never be run when the arm is bent as here shown, as a few moments' running while the arm is in this folded position will damage the duplex spring at the pivotal joint more than would a month's proper use of the Engine.

# Dr. W. G. A. Bonwill's Dental Engine.

Patented July 31, 1883.



In accordance with previous announcements in the DENTAL COSMOS we are now prepared to supply the Dental Engine which has been widely and favorably known as the invention of Dr. W. G. A. Bonwill.

The cut shows the distinctive features of this Engine, consisting chiefly of the corded and jointed arms, modeled, as claimed by the inventor, after the human arm. By this arrangement the driving cord goes directly to the hand-piece, securing the most direct and positive transmission of power, without back motion, and making less weight upon the hand of the operator.

The band is kept at a uniform tension by a telescoping tube at the top of the standard.

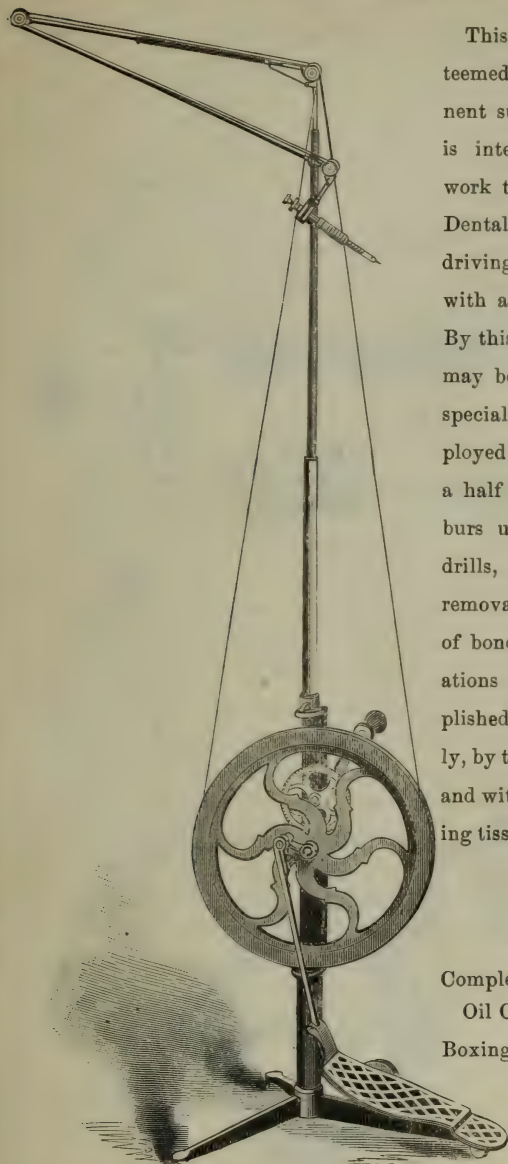
## PRICE.

Complete, with Wrench and Oil-Can	.	.	.	.	.	\$44.00
Boxing	.	.	.	.	.	.75



# Dr. W. G. A. Bonwill's Surgical Engine.

Patented July 31, 1883.



This Engine, which is highly esteemed by some of the most prominent surgeons of the United States, is intended especially for heavier work than is usually required of the Dental Engine. Attached to the driving-wheel are two geared wheels with a crank for working by hand. By this means the speed and power may be greatly increased. Various special instruments may be employed, such as circular saws from a half to four inches in diameter, burs up to one inch in diameter, drills, corundum wheels, etc. The removal of necrosed bone, resection of bone, trephining, as well as operations upon soft tissues, are accomplished readily, quickly, and smoothly, by the aid of the Surgical Engine, and with less injury to the surrounding tissues than by any other method.

## PRICE.

Complete, with Wrench and			
Oil Can	.	.	\$50.00
Boxing	.	.	.75



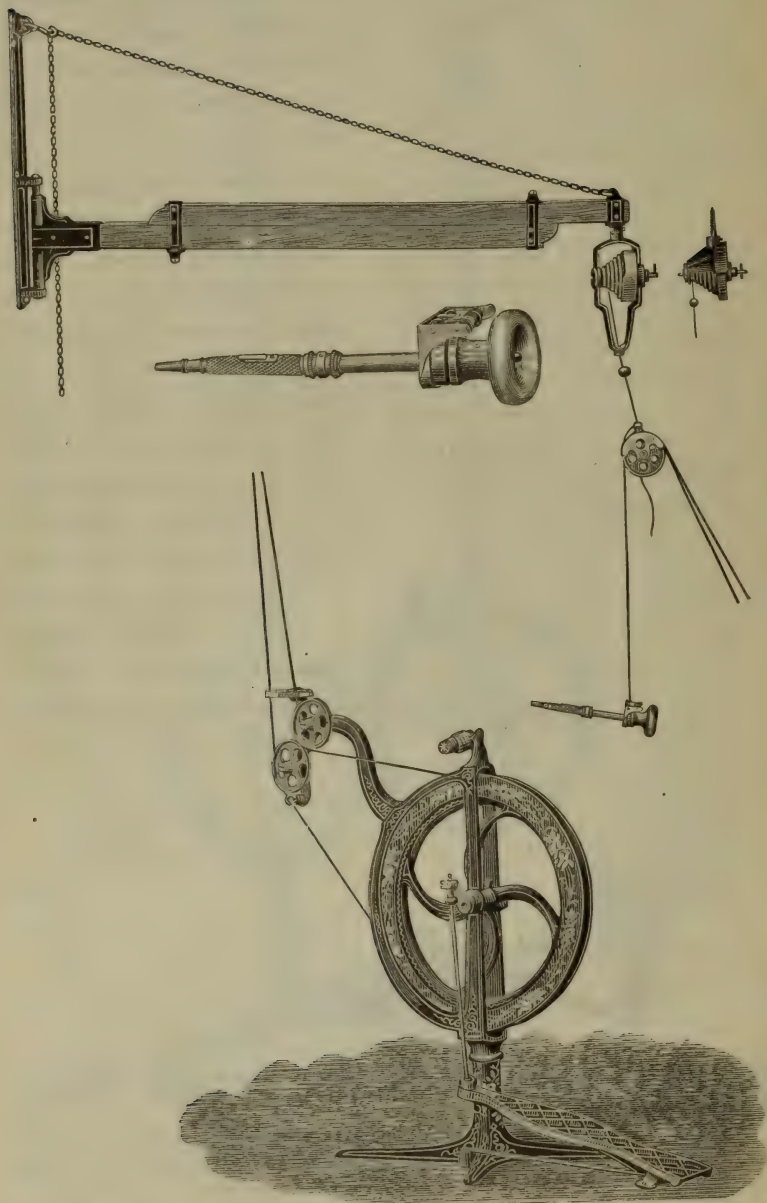
## Camels' Hair Bone-Center Tooth-Brush Wheels.

Tooth-Brush Wheels of Camels' Hair having been called for, we have added them to our stock, and they will hereafter be known as No. 3. Made only with stem.

Price, with Stem . . . . . each 50 cents.

# Suspension Dental Engine.

INVENTION OF DR. W. S. ELLIOTT.



# Suspension Dental Engine.

Patented Feb. 13, 1872; July 6, 1880. Reissue Nov. 12, 1872.

The working parts of the Suspension Dental Engine are well shown on the opposite page. The treadle is pivoted to the base, and may be worked from various positions, at the convenience of the operator. On a projection or arm of the column which supports the fly-wheel are two pulleys, by which the driving-cord or belt is directed to the sheave-pulley, whence it passes to the shaft which carries the bur. The sheave-pulley is suspended by a cord from a fusee attached to the ceiling of the room, or to a crane which we supply for the purpose. The fusee is adjusted to accurately balance the weight suspended from it, so that any interference with the proper tension of the driving-cord by the necessary movement of the hand-piece in operating is automatically compensated. The shaft of the hand-piece which carries the bur is prolonged to pass through a heavy knob or balance-weight, around the neck of which is a groove for the driving-cord. This device is thus made to act as a fly-wheel, and serves not only to keep the hand-piece well balanced, but also to give momentum and greatly increased steadiness to the cutting-instrument. Being suspended on a cord, the hand-piece is free to move in any and every direction; and the bur can be readily applied to a cavity in any position in the mouth.

The crane should be used for the attachment of the fusee in all cases where the ceiling of the operating-room is high enough to permit it. It is a more reliable method of suspension, and being fastened to the window-casing by means of a wall-plate, its use avoids the necessity of marring the ceiling, gives greater facilities for adjustment, and enables the operator to swing the whole apparatus out of the way when not in use, while keeping it always within reach when wanted. The crane has a sliding extension-arm controlled by set-screws. At its shortest adjustment the socket for the fusee is thirty-four inches, and at its greatest extension fifty-six inches, from the wall-plate. Within this range it may be secured at any point required.

In ordering, state whether the suspension is to be made from the crane or the ceiling.

## PRICES.

Complete, including Crane and Fourteen Instruments	\$55.00
Without Crane, but including Fourteen Instruments	50.00
Boxing	1.00



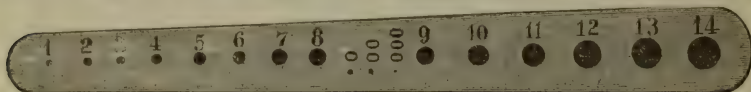
# Reduction in Prices of Burs, etc.,

MADE BY THE LATE

## New York Dental Manufacturing Co.

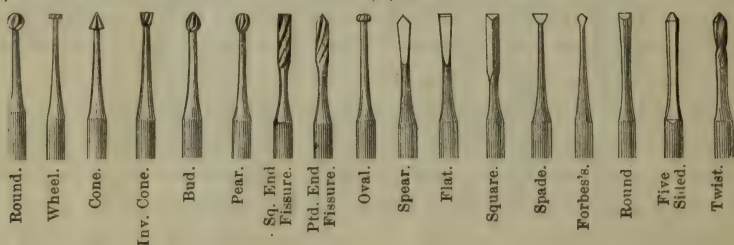
Having purchased the Stock, Machinery, etc., of the New York Dental Manufacturing Co., we offer their Burs and other goods at reduced prices.

These reductions apply to all finished instruments and as well to those under way at the time of purchase; that is, we will finish the goods which were found in the factory in some stage of manufacture, and sell them at these prices.



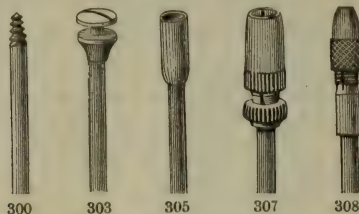
### BURS.

### DRILLS.



Stoned Cavity Burs, Nos. 000 to 5	.	.	.	.	per doz. \$2.50
" " " " 6 " 8	.	.	.	.	" 2.25
Keen Edge Cavity Burs, Nos. 000 to 5	.	.	.	.	" 2.00
" " " " 6 " 8	.	.	.	.	" 1.75
Drills, all sizes	.	.	.	.	" 1.75

**BURS AND DRILLS FOR RIGHT-ANGLE, SAME RATES AS ABOVE.**



### MANDRELS.

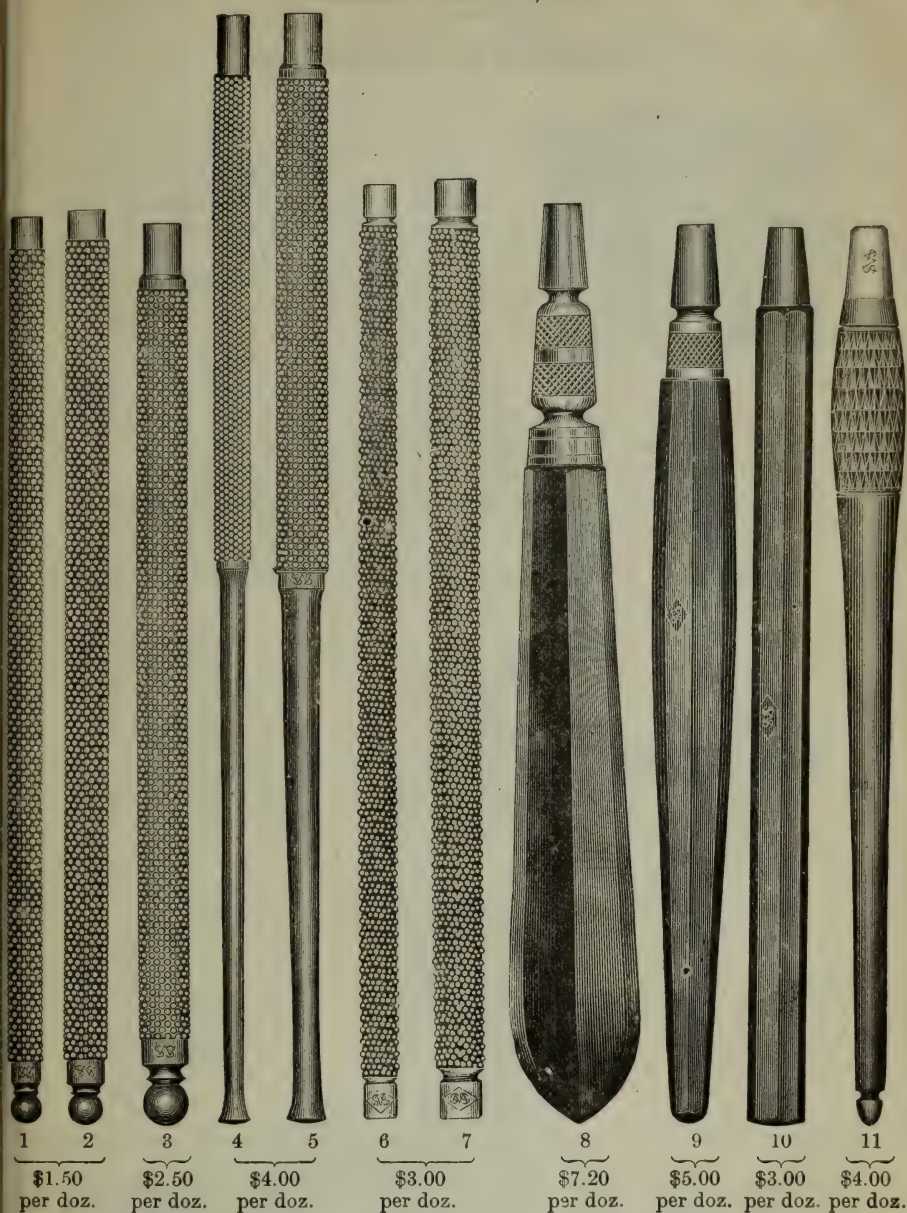
No. 300	.	.	each \$0.05	No. 305, Plain	.	each \$0.20
" 301½, Flexible	.	"	.16	" 307	.	" .25
" 303	.	"	.20	" 308, Needle Chuck.	"	.50

There are other instruments, such as Plug-finishing Burs, Smooth and Corrugated Burnishers, Half-finishing Burs, Mounted Stones, Disks, etc., but not a sufficient stock of either class to warrant advertising in detail by number, which will be sold at correspondingly low rates.

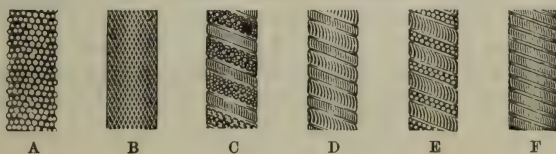
*To those who purchase these instruments in lots of twenty-five dollars cash at one time a discount of 10 per cent. will be given.*

# Socket-Handles for Cone-Socket Points.

Patented November 16, 1880.



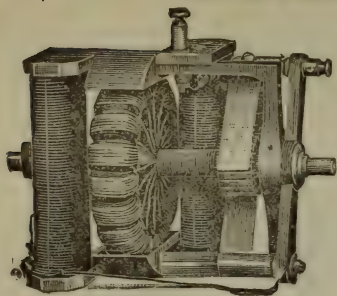
## STYLES OF KNURLS.



# ELECTRIC MOTOR AND BATTERY

FOR THE

## DENTAL ENGINE.

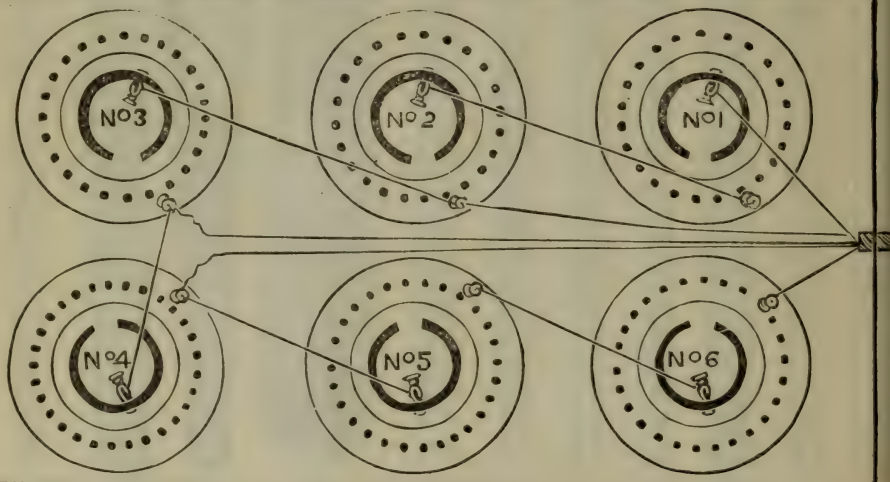


MOTOR.

The "Detroit Motor" has been for some months a prolific subject for speculation among dentists, not a few of whom have seen it working, as it was exhibited at the meetings of the American and Southern Dental Associations and the Dental and Oral Surgery Section of the International Medical Congress. It has also been in practical operation in the offices of a number of practitioners, to their satisfaction.

By a special arrangement with the manufacturer we now offer the Detroit Motor Company's Battery and Motor, in the belief that they will meet the requirements of operators who prefer to run their engines by other than foot-power.

The advantages claimed for the Motor are: It is very light, weighing only three and one-half pounds; it is very strongly and substantially made; it will supply any amount of power required in operative dentistry; it will run backward equally as well as forward; it is instantly reversible; it is easily started; it has no dead centers.



BATTERY.

The Battery, which consists of six cylindrical cells, each six inches in diameter by eight inches deep (inside measurements), placed in a neat box, requires but little attention. Except when necessary to change the fluids, it need not be touched. The cost per hour for actual work is very little, and there is practically no consumption of material when the Battery is at rest.

The Battery is run by two fluids, easily distinguished by their colors. To charge the Battery, three and one-half gallons of the red fluid, for the cells, and one gallon of the white, for the porous cups, are required. The fluid in the porous cups should



be changed after say seventy-five to one hundred hours of work; while that in the cells will bear from three to four hundred hours' actual service before becoming exhausted. Hence, four gallons of the white fluid will be used before the red fluid (three and one-half gallons) needs renewal.

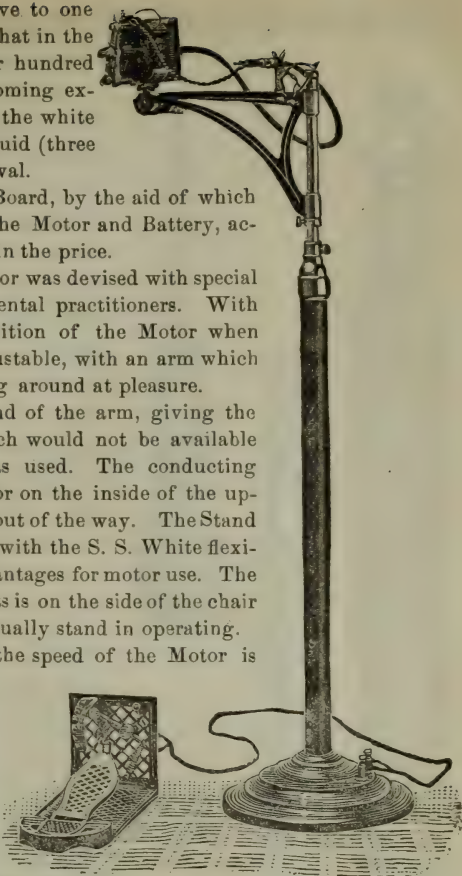
A Motor Stand and a Switch-Board, by the aid of which the operator has full control of the Motor and Battery, accompany them and are included in the price.

The Stand for carrying the Motor was devised with special reference to the convenience of dental practitioners. With it the operator controls the position of the Motor when in use. It is solid and easily adjustable, with an arm which can be raised or lowered or swung around at pleasure.

The Motor is placed at the end of the arm, giving the full advantage of the swing, which would not be available if an upright support alone was used. The conducting wires are carried up to the Motor on the inside of the upright column, thus placing them out of the way. The Stand was designed particularly for use with the S. S. White flexible arm, as affording superior advantages for motor use. The best position for it for most dentists is on the side of the chair opposite that on which they habitually stand in operating.

The Switch-Board, by which the speed of the Motor is controlled, is best placed handy to the foot of the operator, as the Switch is worked by a pedal. By a slight pressure of the foot, two, three, four, or six cells can be brought into service, giving the Motor any desired speed.

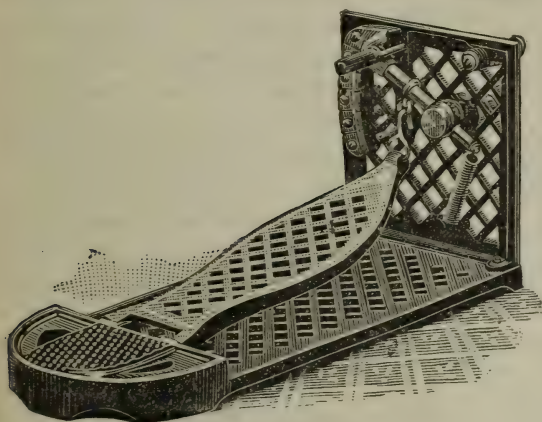
Full illustrated directions for



**MOTOR STAND.**

setting up the Battery and making the fluids supplied with each Battery.

It is our opinion that the dental outfit of the Detroit Motor Company is the best offered to the profession, and we have confidence in its efficiency.



**SWITCH-BOARD.**

### PRICES.

Dental Motor, Battery, Stand, Switch-Board, and four yards of Cable, \$75.00

No charge for boxing.

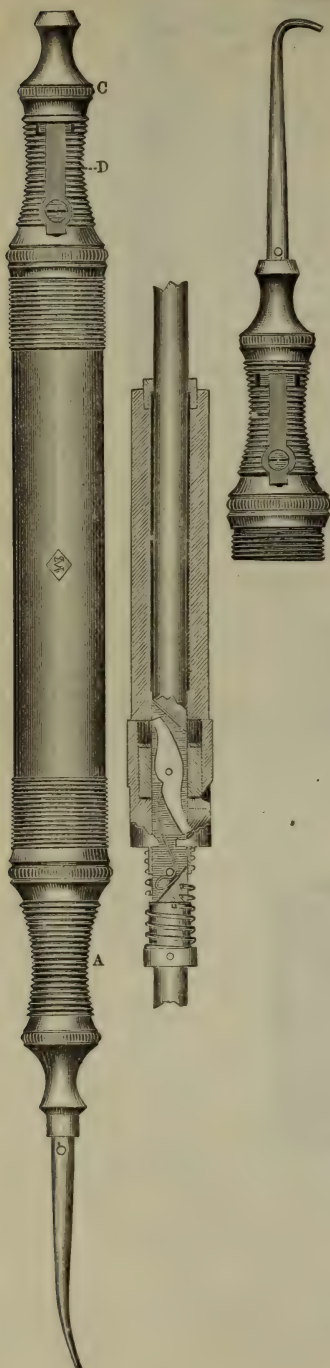
Red Fluid . . . per gallon \$0.60 | White Fluid . . . per gallon \$0.10

Carboys or Jugs extra.

**THE S. S. WHITE DENTAL MFG. CO.**

# THE ABBOTT AUTOMATIC PLUGGER.

PATENT APPLIED FOR.



This Plugger has both direct and back-action movements combined in one instrument, and is designed to avoid most of the defects found in other Automatic Pluggers.

The spindle, carrying the pivotal latch and tripping mechanism, together with the hammer, passes centrally entirely through the casing, and is socketed at both ends for bits, making one end direct or push-blow, while the other is a pull or back-blow.

The force of the blow is regulated by the milled nose C, which is held in place by the holder D, which projects through the nose-piece, fitting into a circumferential groove. The two end pieces (or noses) unscrew from the tubular center casing, allowing the spindle carrying the mechanism to be removed.

Some of the improvements are :

1st. Less friction; no grating sound or rattling of springs.

2d. Less pressure required by the operator for the same force obtained.

3d. The mechanism is free from the case, it being mounted upon and guided by the spindle, thereby saving all friction on the case.

4th. A heavier hammer, with lighter springs, which has after long and careful experiments by many operators been found to be more efficient, and the hammer having hardened steel bushings as bearings, leaving the center free for the spindle to pass, reduces the friction to the minimum.

5th. The back-action movement being combined with the direct and operated by the same mechanism, the appliance is very much simplified.

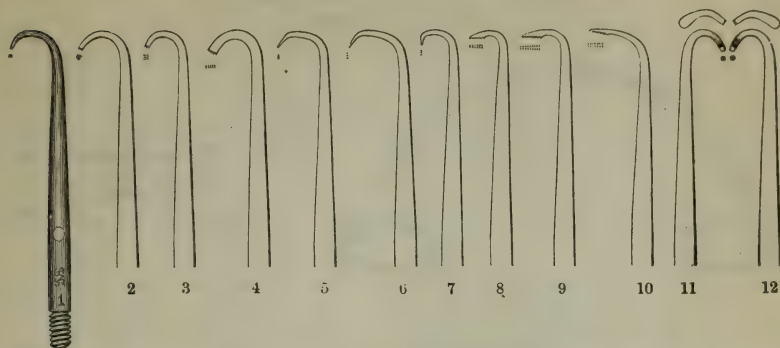
The instrument throughout is made in the very best manner, all the parts liable to wear being of hardened steel.

Both the Cone-socket and Snow & Lewis bits will fit the sockets.

Price, Nickel-plated . . . \$9.00

# Back-Action Automatic Plugger Points.

Designed by Dr. FRANK ABBOTT.



This set of Points was designed by Dr. Abbott for use with the back-action movement of the Abbott Automatic Plugger, and it is believed will cover all requirements in the use of that movement of the Plugger.

## PRICES.

Nos. 1 to 7, inclusive	.	.	.	.	.	.	.	each	\$0.40
Nos. 8 to 12, inclusive	.	.	.	.	.	.	.	"	.50
Per Set	.	.	.	.	.	.	.	.	5.25

## COFFER-DAM RUBBER.

A superior article. The best that can be had. 35 inches wide.

Arrangements with a celebrated rubber goods manufacturer enable us to offer a very superior article of Coffe-Dam Rubber at the prices generally charged by others for greatly inferior qualities. We bought some Coffe-Dam Rubber such as others were purchasing and offered it to the profession with the plain statement that it was equal to that sold elsewhere, but termed by us "inferior grade." It proved very troublesome, as inferior goods almost invariably do, and we decided not to keep it any longer. It has not been difficult for us to obtain a first-class grade, but it has been, until recently, impossible to place it in competition with the popular prices, as we now do.

Thin	.	.	.	.	.	.	.	.	.	per yard	\$1.00
Medium	.	.	.	.	.	.	.	.	.	"	1.50
Thick	.	.	.	.	.	.	.	.	.	"	2.00

## CAUTION.

Much of the Coffe-Dam Rubber offered at other depots and by their travelers is but 26½ inches wide, or 25 per cent. less material to the yard than ours. For instance, our medium 35-inch wide at \$1.50 per yard is as cheap as 26½-inch of equal quality would be at \$1.12½ per yard.

## COFFER-DAM RUBBER IN BOXES.

Form of package suggested by Dr. B. H. Teague.

Put up in boxes containing one yard 35-inch wide Dam, cut into 48 pieces 6 x 4½ inches,—a very convenient size for most operations. The Dam is placed between layers of blotting-paper, which, it is claimed, protect it from the deleterious action of the atmosphere, thus preserving its quality and durability.

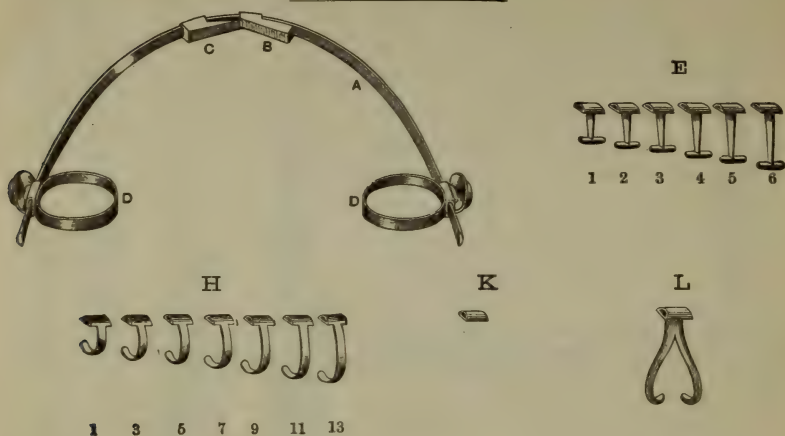
Price, Thin	.	.	.	.	.	.	.	.	.	per box	\$1.25
" Medium	.	.	.	.	.	.	.	.	.	"	1.75
" Thick	.	.	.	.	.	.	.	.	.	"	2.25



# TEETH REGULATORS.

INVENTION OF DR. JOHN J. B. PATRICK.

Patented March 20, 1883.



Dr. Patrick's System of Regulating, which has been highly commended by many practitioners, is entirely different in principle from any that has preceded it. No cast of the mouth is required, and the apparatus, being made of an incorruptible material and readily cleansed, may be used for an indefinite number of cases, thus doing away with the necessity for a special construction for each case. The power used is the elasticity of a bow-spring; anchorage is obtained with bands fitted to the proper teeth, and the irregular teeth are moved by means of wedges, hooks, T-bars, and catches. The bow-spring is of half-round wire, of sufficient length to embrace the dental arch, and the various appliances are attached with slides, which fit the spring accurately, so that they may move steadily. It is believed that any case of irregularity can be readily and successfully corrected with this apparatus.

All the parts, including the spring, are made of 14-k. gold.

Complete set, as above, but with 12 slides, K, in all thirty-one

pieces . . . . . \$18.25

## SEPARATELY.

A, Bow-Spring	. . . . .	each	\$3.00
B, Wedge	. . . . .	"	.60
C, "	. . . . .	"	.60
D, Anchor Bands	. . . . .	"	2.50
E, T-bars	. . . . .	"	.40
H, Hooks	. . . . .	"	.50
K, Slides	. . . . .	"	.20
L, Cuspid Hook	. . . . .	"	.75

# YOKE REGULATORS.

PATENT APPLIED FOR.

Key.

Molar Bow, A.



Molar Coupler.



Molar Yoke.



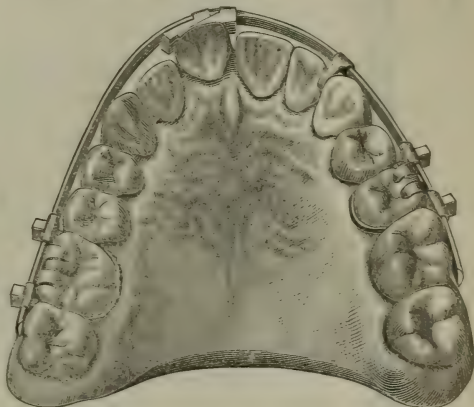
Bicuspid Bow, B.



Bicuspid Coupler.



Molar and Bicuspid Yoke Regulators with Patrick's Bow-Spring, Wedges, and Hook in place.



Molar Yoke in place as an anchorage for a spring or rubber ring or ligature.



These Yokes can be immediately fixed upon the teeth; thus avoiding the delay of or need for an impression. The Bow is to be passed from behind and between the teeth, however close together these may be. The Coupler is then put over the Bow ends, a nut placed in the end of the Key and carried to place on the Bow. When the nuts have been screwed on, if the Bow ends project, they can be dressed off with a corundum point, or be covered by a section of small rubber tubing stretched from nut to nut, or be wound with ligature silk. For further description see DENTAL COSMOS, August, 1887, p. 479. The Yokes will serve for one case after another year after year, and will fit any of the molar or bicuspid in either jaw. They can be used either with or without the Patrick Regulator Bow.

## PRICES.

Molar Coupler,	18-carat Gold	each	\$ 2.00
" Bow, A,	" "	"	.75
Nuts,	" "	"	.25
Molar Yoke, complete	" "	"	3.25
" Bow, A, Iridio-Platinum	" "	"	.65
Bicuspid Coupler,	18-carat Gold	"	1.75
" Bow, B	" "	"	.70
Nuts,	" "	"	.25
Bicuspid Yoke, complete	" "	"	2.95
" Bow, B, Iridio-Platinum	" "	"	.60
Key, Nickel-plated	" "	"	.50
The Set, consisting of two Molar Yokes, two Bicuspid Yokes, and one Key			12.90

For prices of Patrick Bow-Spring, etc., see opposite page. The cost of the Yoke Regulators and Patrick Bow-Spring, etc., as shown in cut of cast, and including a key, is \$11.40.

No. 1. No. 3.

No. 2.

B

No. 4.

C

No. 5.

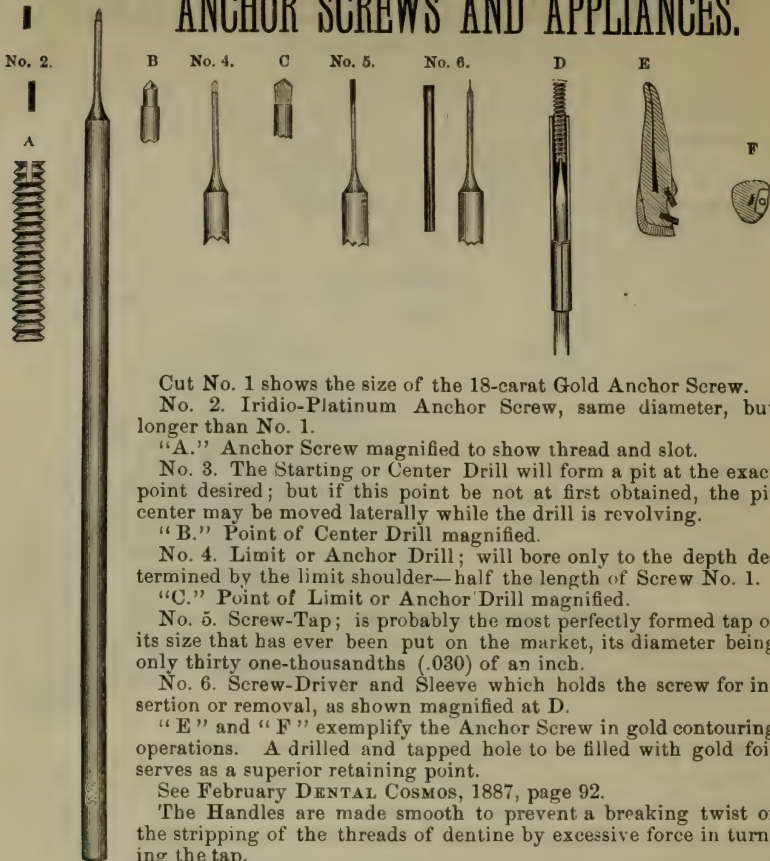
No. 6.

D

E

F

# ANCHOR SCREWS AND APPLIANCES.



Cut No. 1 shows the size of the 18-carat Gold Anchor Screw.  
No. 2. Iridio-Platinum Anchor Screw, same diameter, but longer than No. 1.

"A." Anchor Screw magnified to show thread and slot.

No. 3. The Starting or Center Drill will form a pit at the exact point desired; but if this point be not at first obtained, the pit center may be moved laterally while the drill is revolving.

"B." Point of Center Drill magnified.

No. 4. Limit or Anchor Drill; will bore only to the depth determined by the limit shoulder—half the length of Screw No. 1.

"C." Point of Limit or Anchor Drill magnified.

No. 5. Screw-Tap; is probably the most perfectly formed tap of its size that has ever been put on the market, its diameter being only thirty one-thousandths (.030) of an inch.

No. 6. Screw-Driver and Sleeve which holds the screw for insertion or removal, as shown magnified at D.

"E" and "F" exemplify the Anchor Screw in gold contouring operations. A drilled and tapped hole to be filled with gold foil serves as a superior retaining point.

See February DENTAL COSMOS, 1887, page 92.

The Handles are made smooth to prevent a breaking twist or the stripping of the threads of dentine by excessive force in turning the tap.

## PRICES.

No. 1. Gold Anchor Screws	each	\$0.20
" 2. Iridio-Platinum Anchor Screws	"	.20
" 3. Center Drill	"	.25
" 4. Anchor Drill	"	.25
" 5. Anchor Tap	"	.50
" 6. Anchor Screw-Driver and Sleeve		.30
The set of four instruments	per set	1.25
Center Drill No. 3 and Anchor Drill No. 4 are also made for use with engine.		
Price	each	\$0.25
In ordering state for which hand-piece they are desired.		

## ANCHOR SCREW WIRE.

In response to frequent inquiries we have now in stock Anchor Screw Wire in two-inch lengths. This wire is the same in diameter and thread as the Anchor Screw, and is exactly suited to the Anchor Tap No. 5, with which nuts may be tapped, and small regulating and other fixtures by these means be easily constructed. Short pieces of screw wire inserted on either side of a vulcanite regulating plate to pass between molars or bicuspid close to the gum will firmly hold the fixture in place.

Price, Anchor Screw Wire, Gold	per inch	\$0.50
" " " " Iridio-Platinum	"	.40



# GOLD FOILS AND GOLD FILLING PREPARATIONS.

## GLOBE GOLD FOIL.

This Foil was first offered to the profession nearly fifteen years ago, and has had from the first a hearty appreciation and an unprecedented sale. It has probably as large a sale to-day as any make of Gold Foil used by dentists.

### SIX VARIETIES.

*Non-Cohesive or Soft. Semi-Cohesive. Extra-Cohesive.*

For sale in numbers 3, 4, 5, 6, 8, 10, 20, 30, 40, 60, and 120.

*Crystallized (Corrugated) Dead Soft. Crystallized (Corrugated) Semi-Cohesive.*  
Supplied in Nos. 3, 4, 5, and 6.

*The Non-Cohesive or Soft Foil.* An exceedingly soft Gold which when made up into masses or blocks, cylinders, or pellets, yields readily under the instrument without "balling."

*The Semi-Cohesive Foil.* This is a grade between the Soft and Extra-Cohesive, having more cohesiveness than can be developed by heating soft foil.

*The Extra-Cohesive Foil.* This Foil, as put up, may be used cohesively when made into pellets or ribbons. When heated in the flame of an alcohol lamp it becomes *exceedingly cohesive*, and can then be used successfully only by those who fully understand how to take advantage of this property. Attention is called to the unusual softness exhibited by this grade of Gold under the burnisher after having been packed cohesively.

*Crystallized Dead Soft Foil.* Surface corrugated by the Kearsing process (pat. 1871). An exceedingly soft foil.

*Crystallized Semi-Cohesive Foil.* Surface corrugated by the Kearsing process (pat. 1871). Its cohesiveness can be increased by heating. Useful for rapid work.

## Extra-Cohesive Globe Gold Foil (Rolled).

Prepared with great care entirely by Rolling.



A most valuable heavy Gold for finishing fillings. It combines all the softness, toughness, and tenacity of which gold is capable. The commendations which it has received enable us to claim that it is softer than beaten gold, and therefore greater in its adaptability

to margins and in its solidity and strength after packing, and that to produce these results it requires less labor than any heavy *beaten* gold.

Put up in small envelopes bearing the above label.

Nos. 20, 30, 40, 60, 120, and 240 kept in stock.

Prices of Globe Gold Foils uniform, as follows:

1/8-oz.	.	.	.	.	.	.	.	.	.	.	\$ 4.00
1/4-oz.	.	.	.	.	.	.	.	.	.	.	15.00
1-oz.	.	.	.	.	.	.	.	.	.	.	30.00
2 ounces at one time	.	.	.	.	.	.	.	.	.	per oz.	29.00

# "1000 FINE" GOLD FOIL.



This high standard Gold was introduced many years ago by Messrs. Johnston Bros., and recently revived by us at the solicitation of many practitioners who knew its value. It at once regained its old prominent position, and it has a large sale, being considered by many *the best foil ever made*. As its name implies, all varieties of this Foil, and cylinders and ribbons made from it, will stand the most searching test for purity. The crystallization is so controlled in the process of manufacture as to give the preparations made from it peculiarly fine characteristics. It has a remarkable softness, which enables the operator to pack it like *damp snow*, while by heating all grades of cohesiveness may be obtained without impairing any of its working qualities.

"1000 Fine" *Soft Gold Foil*. Very soft and easily worked, adapting itself readily to the walls of the cavity, yet tough and strong. Can be made cohesive by heating.

Supplied in Nos. 2, 3, 4, 5, 6, 10, 20, 30, 40, 60, and 120.

"1000 Fine" *Cohesive Foil*. For use cohesively only, and will be found to contain that quality sufficiently for most cases as taken from the book; can be made more cohesive by heating.

Supplied in Nos. 2, 3, 4, 5, 6, 10, 20, 30, 40, 60, and 120.

"1000 Fine" *Unannealed Gold Foil*.





# "1000 FINE" COLD-WELDED CYLINDERS.

Patent December 19, 1871.

MANUFACTURED BY  
**THE S. S. WHITE DENTAL MFG CO.**  
PHILADELPHIA.  
NEW YORK.  
BOSTON.  
BROOKLYN.  
CHICAGO.

**1/8 OZ.**

TABLE OF  
NOS. & LENGTHS.

NUMBER. **1000 FINE** STYLE.

**GOLD FOIL**

**COLD WELDED**

**CYLINDERS**

*These Cylinders are made from our 1000 FINE gold foil by an entirely novel and original process which leaves the gold in a peculiarly soft condition.*

No.	LENGTHS.						
	$\frac{2}{32}$	$\frac{3}{32}$	$\frac{4}{32}$	$\frac{5}{32}$	$\frac{6}{32}$	$\frac{7}{32}$	$\frac{8}{32}$
1							
2							
3							
4							
5							
6							

These Cylinders, introduced in 1884, quickly met with approval. The ordinary way of welding gold cylinders to prevent their unrolling is by heating the free end. This has a tendency to harden that portion of the cylinder, thus rendering the mass uneven in texture. By our peculiar process of cold-welding this defect is entirely overcome and the cylinders are homogeneous.

"1000 Fine" Cold-Welded Soft-Gold Cylinders. Soft and very adaptable, but sufficiently cohesive when heated.

Sizes 1, 2, 3, 4, 5, 6, and assorted.

"1000 Fine" Cold-Welded Cohesive Gold Cylinders. Although cohesive, they are readily adaptable, and very rapid work can be done with them.

Supplied in Nos. 1, 2, 3, 4, 5, 6, and assorted.

## PRICES.

$\frac{1}{8}$ -oz. . . . .	\$ 4.00
$\frac{1}{2}$ -oz. . . . .	15.00
1-oz. . . . .	30.00
2 ounces at one time . . . . .	per oz. 29.00

1-8 Oz. Thickness No. ....	1000 FINE GOLD FOIL <b>FLEXIBLE FOLDED RIBBON</b> For Contour and other Cohesive work.	Style A Narrow.
1-8 Oz. THICKNESS No. ....	1000 FINE GOLD FOIL <b>Flexible Folded Ribbon</b> For Cylinder Work.	STYLE B Medium.

This is another comparatively new preparation, introduced in 1884 with gratifying success. To the large class of operators who use foil in the form of Ribbons, this preparation offers the advantages of saving the time of folding the ribbons, of mathematical exactness, each ribbon of a given width being exactly like every other, and of purity and cleanliness. It being untouched by the hands, the gold is in the same condition as when the foil comes from the beaters' skins. Made entirely by machinery, of strips of No. 4 "1000 Fine" Foil, laid up smoothly and evenly into ribbons of eight thicknesses, with the cut edges turned into the center of the ribbons, which are then passed between milled rollers to render them pliable, so that each ribbon can be readily folded back and forth upon itself and welded in its place, until the work is completed.

Put up in packages of  $\frac{1}{8}$ -oz., designated as Narrow, Medium, and Wide, Styles A and B.

The package marked Narrow contains an assortment of Ribbons  $\frac{2}{32}$ ,  $\frac{3}{32}$ , and  $\frac{4}{32}$  of an inch wide.

The Medium contains  $\frac{5}{32}$ ,  $\frac{6}{32}$ , and  $\frac{7}{32}$  of an inch wide.

The Wide contains  $\frac{8}{32}$  of an inch wide.

"1000 Fine" *Flexible Folded Ribbon Gold, Style "A."*

For contour and cohesive work.

When freshly annealed, these Ribbons are thoroughly cohesive, while the exactness with which the machine lays the folds of foil insures the most perfect form of gold ever produced for filling teeth on the cohesive principle. The layers of foil composing the ribbon lie so evenly together that the gold can be welded into a dense, solid mass with the least possible labor. Any method of preparing foil for cohesive fillings which rumples or wrinkles the foil, as by the common mode of twisting it into ropes and then cutting it into pellets, is seriously objectionable, because it has a tendency to make the gold work harshly under the instrument; and it almost invariably produces a filling of uneven density. The "Style A Folded Ribbon" Gold has been devised expressly to overcome these difficulties.

"1000 Fine" *Flexible Folded Ribbon Gold, Style "B."*

Made from "1000 Fine" Dead Soft Foil and especially designed for cylinder fillings. Reliably cohesive when annealed.

The care and time necessary for the manufacture of the Folded Ribbon Gold increase the cost considerably as compared with the ordinary preparations of gold, but we are enabled to offer it at the following


#### PRICES.

$\frac{1}{8}$ -OZ.	. . . . .	\$4.00
$\frac{1}{2}$ -OZ.	. . . . .	15.50
1-OZ.	. . . . .	31.00

# VELVET GOLD CYLINDERS.


TRADE MARK "VELVET GOLD."

MANUFACTURED BY  
**THE S.S. WHITE DENTAL MFG CO.**  
PHILADELPHIA. BROOKLYN.  
NEW YORK. BOSTON. CHICAGO.



16 OZ.

TABLE OF NOS. & LENGTHS.

NUMBER  STYLE.

**VELVET GOLD CYLINDERS**

*These Cylinders were especially designed for the HERBST'S METHOD of filling, but have been found equally valuable when used under the Mallet or HAND PLUGGER. When the SOFT and PLASTIC quality is desired they should be used as sold: when annealed they become cohesive without becoming harsh.*

No.	LENGTHS.						
	$\frac{2}{32}$	$\frac{3}{32}$	$\frac{4}{32}$	$\frac{5}{32}$	$\frac{6}{32}$	$\frac{7}{32}$	$\frac{8}{32}$
1							
2							
3							
4							
5							
6							

When this superb preparation of Gold was first put upon the market we made the broad claim that it would be found to possess a wider range of usefulness than any other form of gold ever offered to dentists. It has now been before the profession long enough to prove our claim. Had it been on the market when "cohesive" gold was introduced, the schism between the "cohesive" and "soft" golds would never have risen. The Velvet Gold would have answered all purposes. It is the softest gold ever used in dentistry, and with its unequalled softness it combines toughness and tenacity, condensing quickly under the instrument. Its peculiar softness is accurately expressed by the term "velvet;" hence its name. It may be packed by any of the ordinary methods,—with the Herbst burnishers, with the automatic, hand, or electric mallet, or by hand pressure,—and by whatever method it is used it acts kindly, is readily adapted to the walls of the cavity, and adheres firmly.

The manufacture of the Velvet Gold Cylinders involves the necessity for the most constant care and about double the labor expended on ordinary forms. We are therefore compelled to charge a higher price than for ordinary cylinders, but the superiority of the Velvet Gold Cylinders will, we feel confident, make their use to many practitioners an economy when compared with cheaper goods.

Put up in  $\frac{1}{16}$ -oz. packages in Nos. 1, 2, 3, 4, 5, 6, and assorted.

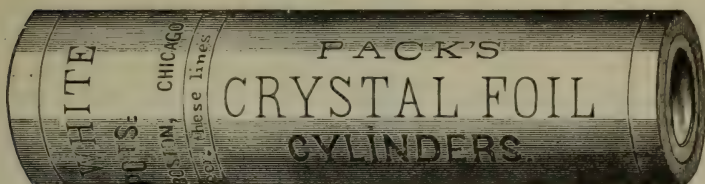
## PRICES.

$\frac{1}{16}$ -OZ. . . . .	\$ 2.25
$\frac{1}{2}$ -OZ. . . . .	17.50
1 oz. . . . .	35.00



# PACK'S GOLD CYLINDERS.

Patented Dec. 17, 1871, and July 4, 1876.

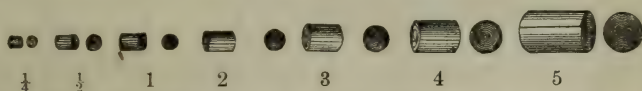


Universally known, highly approved, and thoroughly reliable. The sale of these Cylinders has steadily increased, and they are to-day more generally used than at any previous time since their introduction. We have recently made improvements in our processes of manufacture, the result of which is greater uniformity in the Cylinders than before.

## FOUR VARIETIES.

*Semi-Cohesive Crystal Foil Cylinders. Soft Crystal Foil Cylinders. Semi-Cohesive Crystal Loose-Rolled Cylinders. Soft Crystal Loose-Rolled Cylinders.*

We can also furnish, on order, these Cylinders of plain foil, either Soft or Cohesive.



Each of these varieties is put up in  $\frac{1}{8}$ -oz. boxes (Nos.  $\frac{1}{4}$ ,  $\frac{1}{2}$ , 1, 2, 3, 4, 5, and assorted), in a manner calculated to preserve the Gold unimpaired for any length of time.

# PACK'S CRYSTAL GOLD PELLETS.



Made of No. 60 Foil. Unequaled for rapid work and highly valued by many operators.

## TWO VARIETIES.

*Semi-Cohesive Crystal Gold Pellets. Soft Crystal Gold Pellets.*

Medal awarded at Centennial Exhibition.

SIZE 1. SIZE 2. SIZE 3. SIZE 4.



Put up in  $\frac{1}{8}$ -oz. boxes, Sizes 1, 2, 3, and 4, separately; also in boxes containing Sizes 1 and 2; Sizes 2 and 3; Sizes 3 and 4.

Prices of Pack's Cylinders and Pellets uniform, as follows:

$\frac{1}{8}$ -oz.	.	.	.	.	.	.	.	.	.	\$4.00
$\frac{1}{4}$ -oz.	.	.	.	.	.	.	.	.	.	15.00
$\frac{1}{2}$ -oz.	.	.	.	.	.	.	.	.	.	30.00
2 ozs. at one time	.	.	.	.	.	.	.	.	per oz.	29.00

# Kearsing's Plastic Surface Gold Blocks.

FOR SIZES, SEE BELOW.



This form of Gold is manufactured on an entirely different principle from any other of the numerous varieties now on the market. Is entirely mechanical, and after the last manipulative process it is subjected in a muffle to a heat just below the melting point, which makes a peculiar preparation of the surface, facilitating cohesion and rapid work.

Made of No. 60 Foil.

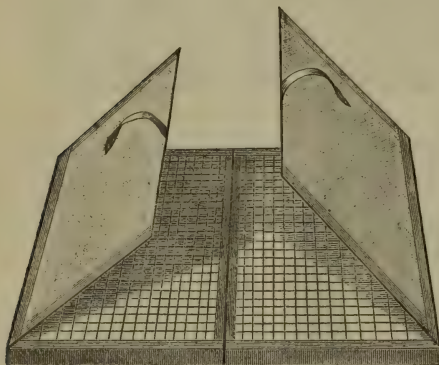
Put up in  $\frac{1}{8}$ -oz. boxes, Sizes, 1, 2, 3, 4, separately. Also, in boxes containing Sizes 1, 2; Sizes 2, 3; Sizes 3, 4, and assorted.

## PRICES.

$\frac{1}{8}$ oz.	.....	\$ 4.00
$\frac{1}{4}$ -oz.	.....	15.00
1-oz.	.....	30.00
2 ozs. at one time	per oz.	29.00

# Kearsing's Improved Universal Gold Blocks.

Patented May 21, 1878.



Of the same forms as the old Kearsing's Blocks, but made of very soft cohesive gold, making them really a new filling-material. The cohesive quality can be increased by annealing. The Blocks are adapted to all the usual methods of packing, and they make a very solid filling when put in with the rotary burnishers. They are laid smoothly in a folding box which when closed holds them securely in place, preventing their becoming bruised or otherwise injured in the handling of the package and assuring their delivery to the dentist in good order. Application has been made for a patent for this excellent device.

	1	2	3	4
SIZES:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Put up in  $\frac{1}{8}$ -oz. boxes, Sizes 1, 2, 3, 4, separately; also in boxes containing Sizes 1 and 2; Sizes 2 and 3; Size 3 and 4; and assorted.

Price, $\frac{1}{8}$ -oz.	.....	\$4.00
" $\frac{1}{4}$ "	.....	15.00
" 1 "	.....	31.00

# KEARSING'S GOLD FOIL.

Soft and Cohesive, Nos. 3, 4, 5, and 6.

An excellent Foil, giving good satisfaction.

Price, $\frac{1}{8}$ -oz.	.....	\$3.75
" $\frac{1}{4}$ "	.....	14.00
" 1 "	.....	28.00

Oz.



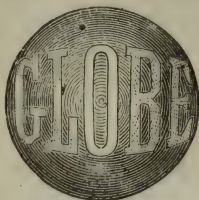
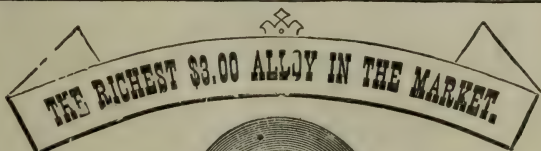
# New Amalgam

Formula of  
D. B. F. Arrington

ENTERED ACCORDING TO ACT OF CONGRESS. IN THE YEAR 1868 BY DR. B. F. ARRINGTON IN THE CLERKS OFFICE OF THE DISTRICT COURT OF THE UNITED STATES FOR THE EASTERN DISTRICT OF PENNSYLVANIA.

This has been the leading amalgam in the market for nearly a quarter of a century, outselling all of its competitors and steadily increasing in popularity each year. None of the higher-priced amalgams which have been so extensively advertised have a better record in the saving of teeth than Arrington's. Put up in quarter-ounce, half-ounce, and ounce envelopes.

Orders for less than 4 ounces	per oz.	\$2.50
" 4 ozs. and less than 10 ozs.	"	2.25
" 10 ozs. or over	"	2.00



## ❖ Gold and Platinum Alloy. ❖

MANUFACTURED BY

THE S. S. WHITE DENTAL MFG. CO.

This is an Alloy of Tin, Silver, Gold, and Platinum. While a reference to the price will show that we cannot claim a very large percentage of the more costly metals, we do claim that it is richer in Silver, Platinum, and Gold than any Alloy heretofore put on the market at that price. For all purposes where a platinum-and-gold alloy is desirable, this preparation is confidently recommended as the most useful and valuable yet offered at so low a figure. It has a steady and large sale. Put up in ounce, half-ounce, and one-third ounce envelopes.

Price	per oz.	\$3.00
" for 2 ounces		5 50
" " 4 "		10.00
		35





For convenience in handling, and incidentally to save time to purchasers, our Standard Gold Solders are now put up in envelopes (see design above) containing respectively one and two dwts., full weight. The advantages of this "new departure" will be at once apparent. We also sell our Gold Solders in the usual way.

#### PRICES.

Gold Solder, 14-k.	per dwt.	\$0.75
" " 18-k.	"	.90
" " 20-k.	"	1.00

### GOLD PLATE, WIRE, ETC.

We have had much satisfaction in the reports from users of our improved Gold Plate and Wire, which were first announced in the DENTAL COSMOS for April, 1885.

#### PRICES.

Standard Gold Plate, 18-k.	per dwt.	\$0.90
" " " 20-k.	"	1.00
" " " 22-k.	"	1.10
" " " 24-k. (Pure Gold)	"	1.15
" " Clasp, 18-k.	"	.90
" " Wire, 18-k., Round and Half-round	"	1.00
" " " 20-k., Round	"	1.10
" " Clasp Wire	"	1.00

Crown-Metal (one side Pure Soft Platinum, the other Pure Gold—equal parts) decidedly the Best Combination for Metal Crowns ever made " 1.00





























We can also supply a Crown-Metal of Gold and Iridio-Platinum, a harder and stiffer composition, at same price as the Gold and Platinum preparation.

Platinum Plate, Pure, Very Soft	} Prices Fluctuate.
" Wire, " "	
Iridio-Platinum Plate, Hard and Elastic	
" Wire, " "	

Also, a full line of Silver Plate, Wire, Solder, etc.

The improved methods by which our Gold Solders and Gold Plate, Wire, etc., are made, and the care exercised to produce them of a standard quality, enables us to assure purchasers of their entire reliability and uniformity. They are not equaled by any other manufacturer.

## A large, heavy-duty metal tool, possibly a mallet or a large screwdriver, with a wooden handle and a metal head. The head has a flat, rectangular face with a grid of circular holes. The handle is dark and textured.

RIGHT	LEFT	RIGHT	LEFT
			
			
			
			
			
			
			

These inventions were described in the DENTAL Cosmos for August, 1887, pages 482 to 485. This description also accompanies each Die-Plate.

PRICES.

37

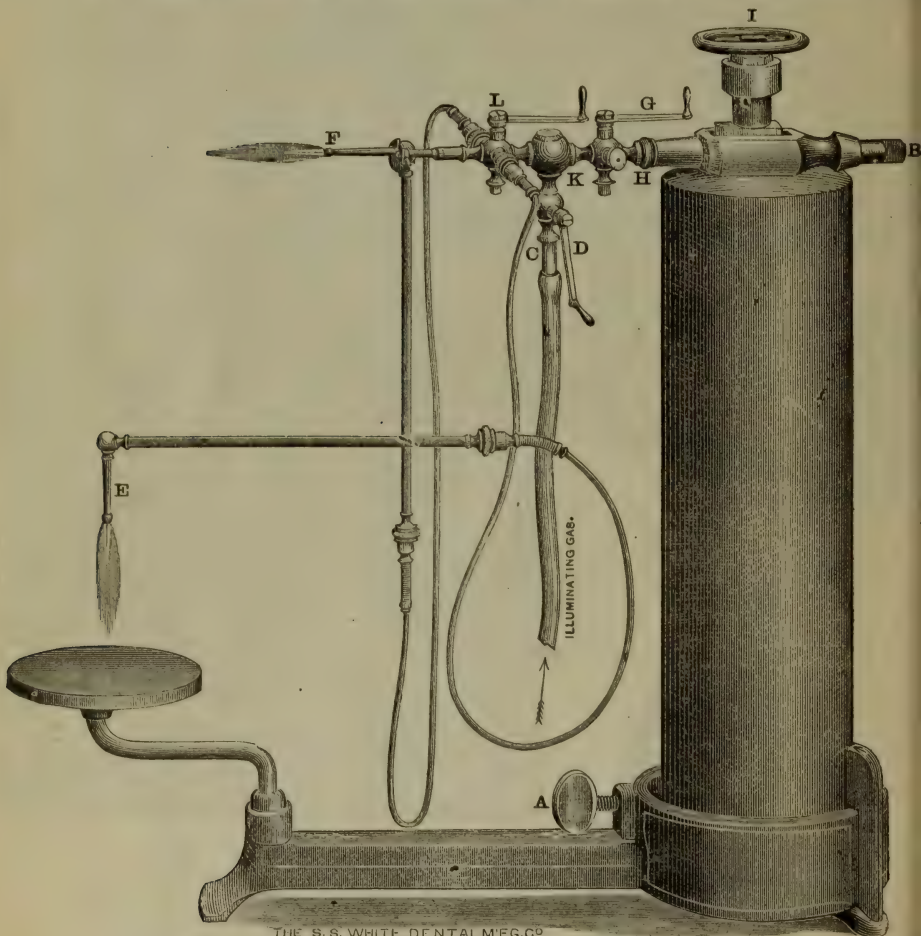
# THE KNAPP BLOW-PIPE.

Invented by Dr. J. ROLLO KNAPP.

Patented in the United States and Great Britain, Sept. 20, 1887.

Patents applied for in France and Germany.

The Knapp Blow-pipe is to all intents and purposes an oxyhydrogen blow-pipe divested of the cumbersome paraphernalia usually accompanying the latter, and reduced to a practical size and shape for soldering operations. It is essentially an apparatus for securing the consumption of hydrogen in a highly oxygenated



atmosphere, the resulting flame being second in intensity only to that of the oxyhydrogen blow-pipe proper. It will melt gold or its alloys in quantities suited to its capacity almost instantly, without other exertion on the part of the operator than the adjustment of a couple of small levers. It is economical of time and materials, and not the least notable of its good qualities is its cleanliness. Its inventor has been accustomed to do all his soldering of crown and bridge-work without leaving the operating-room. It can be used wherever illuminating-gas is available. Any of the soldering operations of the laboratory, from the largest piece of crown-work to the most delicate joining of the narrowest bands or finest



wires, are accomplished with equal facility. With illuminating-gas of good quality and sufficient pressure, a pennyweight of twenty-carat gold can be melted in thirty seconds. When the investment is large, it must first be heated by other means.

The apparatus consists of the blow-pipe attachments, connected to the yoke of a nitrous oxide gas-cylinder, the cylinder being set upright, and secured by a thumb-screw on one end of an iron base or stand, at the other end of which is pivoted a table, upon which to rest the work. The blow-pipe proper is a continuation of the outlet-tube of the gas cylinder. A lever-valve G, regulates the supply of nitrous oxide. Just beyond this valve is the mixing-chamber, K, to which the illuminating-gas is conducted from the gas-bracket by means of rubber-tubing, entering the bottom of the chamber through the valved tube, C. The lever D controls the supply. The mixing-chamber is provided with a gauze screen to prevent the flame from being drawn into the supply tubes. Immediately beyond the mixing-chamber the pipe is branched to afford two flames of different sizes, E and F, which can be used independently of each other, or both together. The valve-lever L regulates the flame in both. For greater convenience in manipulation the pipe-nozzles are connected with the branched pipe by rubber tubing. From the body of the valve L an arm extends, at the end of which is a small scalloped disk as a holder for the flame-nozzles when not in use. In the illustration one of the nozzles is shown in the holder, the other being directed to the revolving table.

The Knapp Blow-pipe has been upon the market for several months, and so far as we know it has given satisfaction to all who have used it, fully substantiating the claims made for it.

It was shown before the American Dental Association at Niagara, in 1886, and the report of Section I, Prosthetic Dentistry, Chemistry, and Metallurgy thus presented it to the association: "His very unique and original blow-pipe, with which he utilizes compressed nitrous oxide with illuminating-gas to produce what is practically an oxyhydrogen flame, promises to be one of the most useful appliances ever offered for dental laboratory use."

In the discussion which followed, Dr. N. W. Kingsley said: "One of his (Dr. Knapp's) inventions is combining nitrous oxide with illuminating-gas, and producing effects which are something marvellous. Every man interested at all in the arts, who witnessed for a moment what Dr. Knapp did with this compound blow-pipe must have been astonished as well as fascinated." Again, speaking of the soldering of crowns to bands, he said: "His (Dr. Knapp's) compound blow-pipe and his simple arrangements, using a little plaster and marble-dust for an investment, enable him to do in a few seconds as much as we, by our old methods, could do in the same number of minutes. The power and the control of that blow-pipe are one of the marvels of the time. The heat is so great and under such control that one of the platinum pins in a porcelain tooth can be melted down into a button while its mate is left untouched."

After using the apparatus for some time, Dr. H. W. Howe, formerly of Lawrence, Kansas, who is well known throughout the West as one of the finest workers in prosthetic dentistry, writes:

"It is perfect. I can solder anything from a full case of gold to a wire the size of a horse-hair. I fill caps and crowns for single teeth or bridge-work, as described by Dr. Knapp in the DENTAL COSMOS, perfectly satisfactorily to myself. In using both jets at one time on heavy cases of invested plate-work, the large flame for heating the case, the other to solder with, I am more than delighted with its perfect work.

"I can utilize my platinum scraps, by either mixing with gold, or melting the scrap platinum. I make solid bands for crown-work by simply jointing the edges nicely and touching with borax, add a little filings from the same piece and have no trouble in melting the joint into one solid piece of the same carat. As to this 'little giant,' I cannot express myself strongly enough to give you any idea of my appreciation of it."

All the details of the apparatus have been well thought out, so as to bring it working under perfect control. The construction is first-class. The blow-pipe parts are nickel-plated, and the stand is tastefully japanned. The valves are what are termed "spring-valves," made so to relieve any undue pressure by the nitrous oxide gas. A detailed description, with directions for use, accompanies each apparatus sold.

The Knapp Blow-pipe is in no sense a blast blow-pipe or furnace.

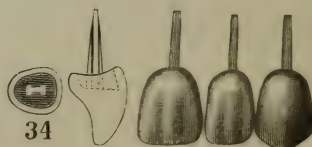
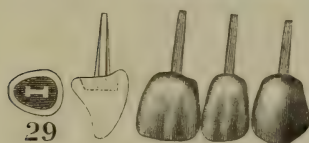
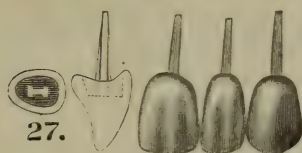
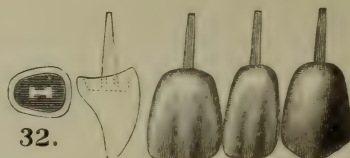
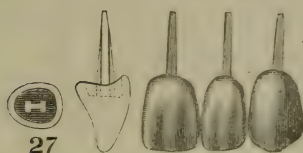
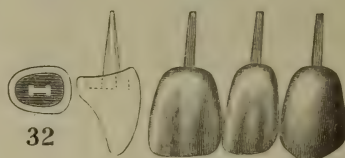
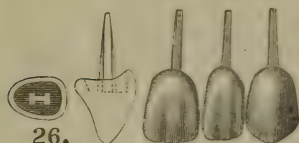
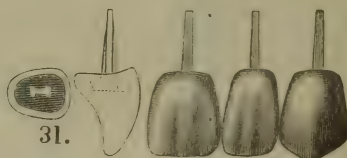
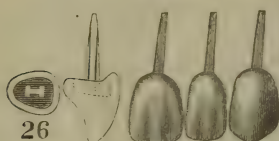
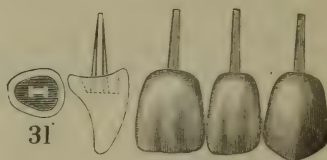
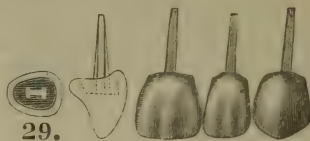
Price, Complete, without Cylinder of Nitrous Oxide . . . \$16.50

# CHART OF PLAIN TEETH AND CROWNS.

## LOGAN CROWNS, UPPER.

### Incisors and Cuspids.

Patented January 2, 1885; August 24, 1886.



### PRICES.

	Single.	\$15.00 lots.	\$25.00 lots.	\$50.00 lots.	\$100.00 lots.
Each	\$0.40	\$0.38	\$0.36	\$0.34	\$0.32

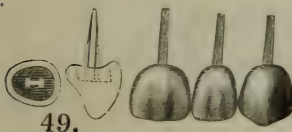
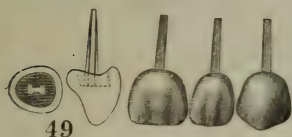
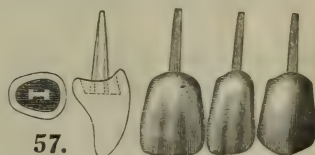
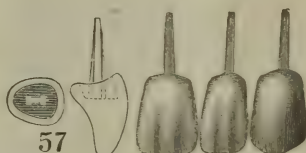
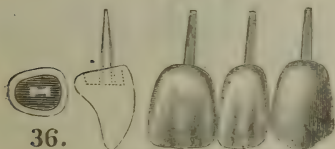
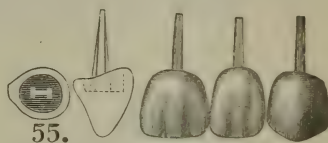
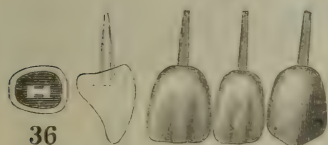
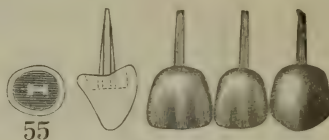
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# CHART OF PLAIN TEETH AND CROWNS.

## LOGAN CROWNS, UPPER.

### Incisors and Cuspids.

Patented January 2, 1885; August 24, 1886.



### LOWER.

### Incisors and Cuspids.



### PRICES.

	Singly.	\$15.00 lots.	\$25.00 lots.	\$50.00 lots.	\$100.00 lots.
Each	\$0.40	\$0.38	\$0.36	\$0.34	\$0.32

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# CHART OF PLAIN TEETH AND CROWNS.

## LOGAN CROWNS, UPPER.

### Bicuspid and Molars.

Patented January 2, 1885; August 24, 1886.



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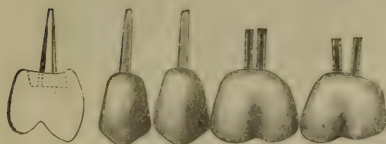
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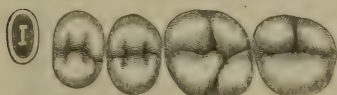
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62



60



63



## LOWER BICUSPIDS AND MOLARS.



65



### PRICES.

	Singly.	\$15.00 lots.	\$25.00 lots.	\$50.00 lots.	\$100.00 lots.
One-Pin Crowns, each	\$0.40	\$0.38	\$0.36	\$0.34	\$0.32
Two " "	.45	.43	.41	.39	.37

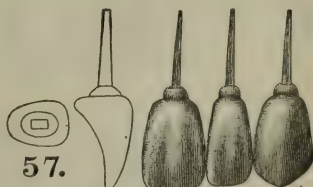
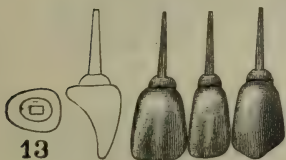
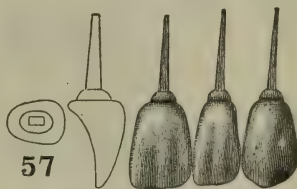
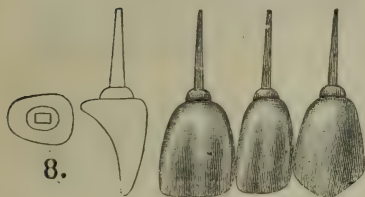
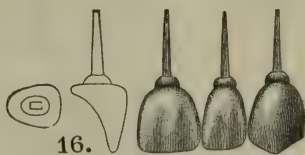
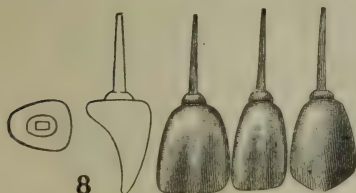
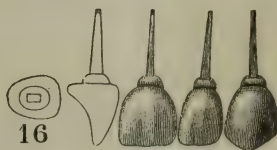
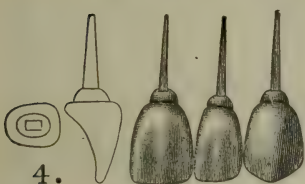
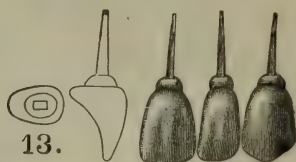
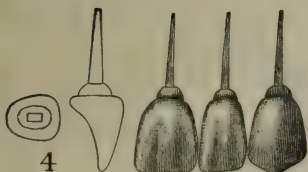
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# CHART OF PLAIN TEETH AND CROWNS.

## PARMLY BROWN CROWNS.

Incisors and Cuspids.

Patent applied for.



### PRICES.

Each	Singly.	\$15.00 lots.	\$25.00 lots.	\$50.00 lots.	\$100.00 lots.
	\$0.65	\$0.63	\$0.60	\$0.57	\$0.55

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# CHART OF PLAIN TEETH AND CROWNS. BONWILL CROWNS, UPPER.

## Incisors and Cuspids.

Patented June 29, 1875; March 1, 1881.



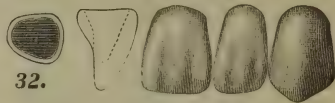
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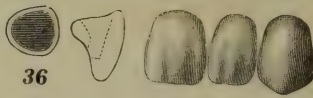
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### PRICES.

	Singly.	\$15.00 lots.	\$25.00 lots.	\$50.00 lots.	\$100.00 lots.
Each	\$0.25	\$0.24½	\$0.24	\$0.23	\$0.22

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# CHART OF PLAIN TEETH AND CROWNS.

## BONWILL CROWNS, UPPER.

Incisors and Cuspids.

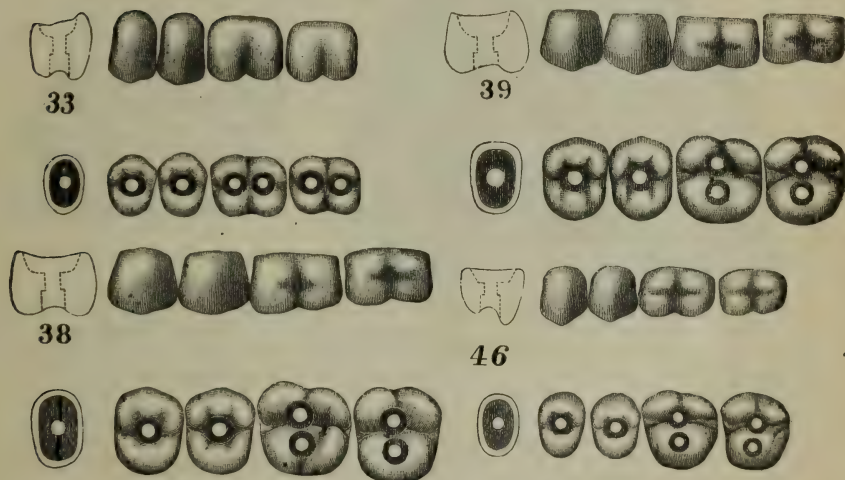
Patented June 29, 1875; March 1, 1881.



## BONWILL CROWNS, UPPER.

Bicuspid and Molars.

Patented June 29, 1875; March 1, 1881.



### PRICES.

	Singly.	\$15.00 lots.	\$25.00 lots.	\$50.00 lots.	\$100.00 lots.
Each	\$0.25	\$0.24½	\$0.24	\$0.23	\$0.22

Copyright, 1887, by E. T. STARR.

# THE VULCAN GOLD LINING.

A PERFECT GOLD COVERING FOR RUBBER PLATES.

PATENT APPLIED FOR.



In this Gold Lining we claim advantages over others as follows:

The Gold is applied in one piece to the surface to be covered.

No extra care is required in packing the flask.

The Lining is composed of chemically pure Gold with a thin covering of pure Silver. The union between the rubber plate and the Gold covering is mechanical; and the sulphur in the rubber when set free by the action of vulcanizing attacks the Silver, sulphurizing the surface, and to this the rubber adheres perfectly.

If the rubber plate is covered on both sides it is tougher when vulcanized, for the reason that during this process the pressure against the metal gives the plate

a surface more dense than it will have if vulcanized in contact with plaster.

The sheets are of the thickness of No. 20 foil, and each book contains about forty-eight (48) square inches,—more than enough to cover six ordinary size plates on one side, or four plates on both sides.

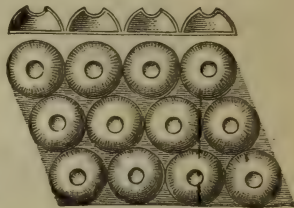
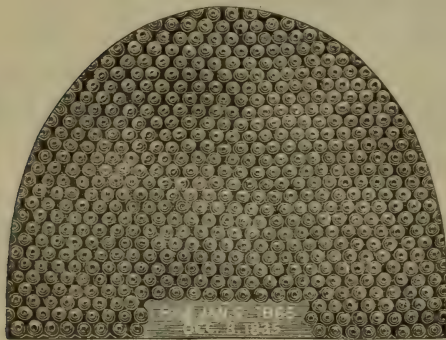
Price . . . . . per package \$5.00

## Surface-Cohesion Forms for Artificial Dentures

Invention of Dr. Joseph Seyer. Patented January 6, 1885; December 8, 1885.

FIG. 1.

FIG. 2.



A thin metallic Form, the surface of which is covered with minute papilliform prominences—shown in Fig. 2 magnified four diameters—which by displacement of mucus at the points of gum contact effect surface cohesion as if the denture were glued to the gums, yet cause no irritation and leave no marked indentations. Adapted for either upper or lower plates. By the aid of this device strong cohesion can be had with a narrow plate, and thus the sense of taste be left unimpaired. Lower plates so made are very firm. Put up in packages containing one dozen Forms size of Fig. 1, which can be cut for either upper or lower plates. Full directions accompany each package.

Price . . . . . per box containing one dozen Forms \$1.00  
Rubber Cement . . . . . per dozen \$4.00; per bottle .35

These Forms are also made of Gold with a thin lining of Silver, similar to our Vulcan Gold Lining, and for like use. Thickness of No. 120 Foil.

Price . . . . . each \$2.50

# Pure Wax Preparations.

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Pink " " . . . . .	"	.50

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Yellow Wax . . . . .	per box	\$0.50
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Pink Paraffine and Wax . . . . .	"	.50
" " Extra Tough . . . . .	"	.60

All kinds of Base-Plate Wax are put up in boxes containing sheets either  $3\frac{1}{2} \times 3\frac{1}{2}$  or  $5\frac{1}{2} \times 3$  inches. When ordering please state which is preferred.

### STICK FORM WAX. Put up in Half-pound Boxes.

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Extra Tough Pink Paraffine and Wax. . . . . per box \$0.60

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Made of Extra Tough Pink Paraffine and Wax.

Upper Forms, 25 in a box . . . . .	per box	\$0.46
Lower Forms, " " . . . . .	"	.40

### MODELLING COMPOSITION. Put up in Half-pound Boxes.

For taking Impressions (4 grades) . . . . .	per box	\$0.63
For Base-Plates . . . . .	"	.63
Upper Forms, 25 in a box . . . . .	"	.75
Lower Forms, 25 in a box . . . . .	"	.75

## Contour Base-Plates.

Suggested by Dr. E. C. Moore.

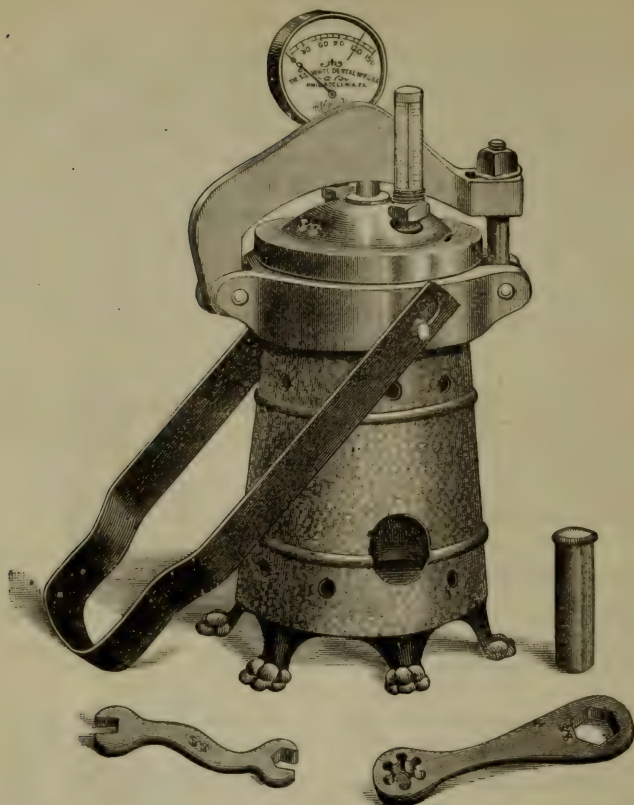
MADE OF YELLOW WAX.

No. 1. Upper—Large size, 12 Plates in a box . . . . .	per box	\$0.40
2. " Small " 24 " " . . . . .	"	.50



# THE MANN VULCANIZER.

PATENTED May 25, 1886.

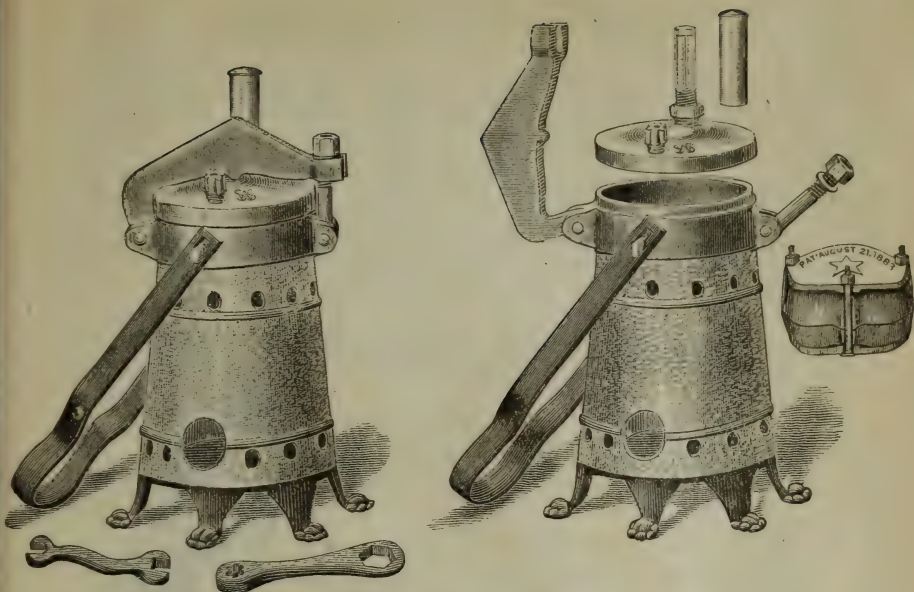


A new vulcanizer coming into the field at this day must have distinctive merits of a high order to enable it to make head against those which have been long before the profession. For the Mann Vulcanizer we claim many advantages over all others of its class.

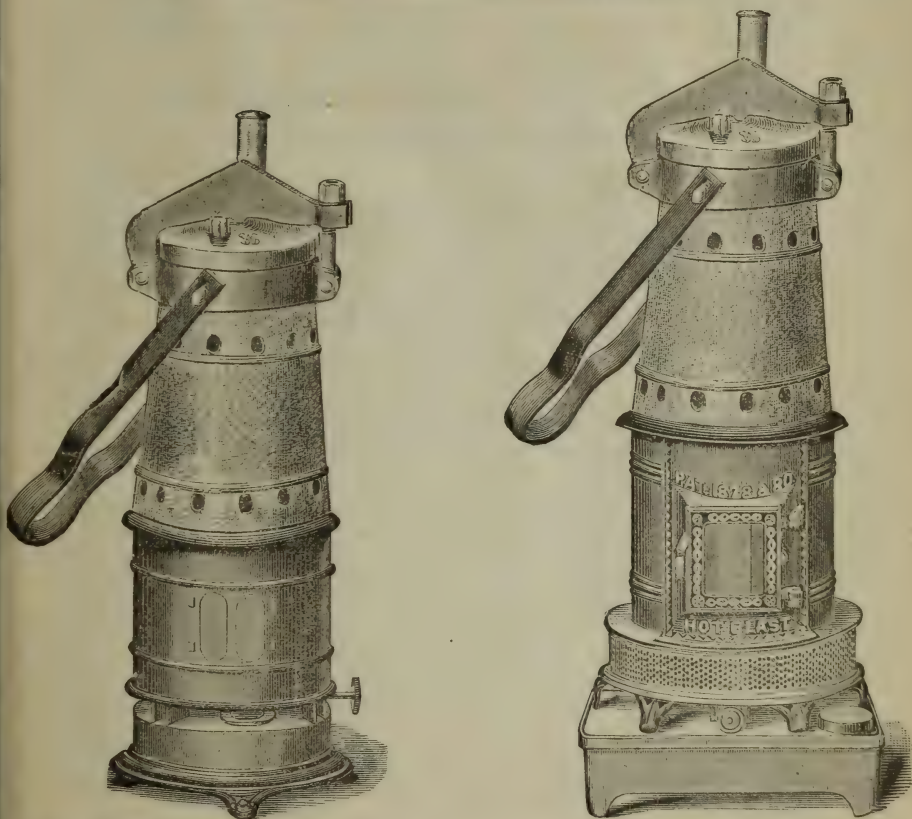
First of these is its superior strength. The boiler is made of extra-heavy seamless copper. The quality of the material, its thickness, and the method of manufacture insure a strength far beyond what any ordinary use of the machine would require; but to make assurance doubly sure, each boiler is tested before being put on sale by both hydrostatic and steam pressure, so that we have absolute knowledge that the strength is far in excess of requirements. The inside diameter is  $4\frac{1}{4}$  inches, providing ample space for the largest flask.

In the facility with which the Mann Vulcanizer is operated is another decided advantage. The lid, instead of being screwed on to the boiler, is fitted neatly, and rests on a shoulder formed on the casting, and is secured by a heavy steel clamping-bar and screw-bolt. One end of the bar is hinged to the side of the boiler, the other end being slotted to receive the screw-bolt, which is hinged to the other side of the boiler. Rubber packing between the lid and the shoulder on which it rests makes the joint steam-tight. The lid is removed by unscrewing the nut of the screw-bolt a turn or two, when the bolt drops out of the slot and the bar is turned back, leaving the lid free to be removed. This method, while it gives as perfect a fastening as the usual plan, affords very much greater facility for opening and closing the boiler. Should the lid stick, by reason of the packing becoming chilled (a common occurrence with all vulcanizers), it is easily pried off with very much less trouble than is required when the top screws on.

Another decided advantage, to which special attention is asked, is the bail, a



Two-Case Vulcanizer rigged for Gas or Alcohol.



Two-Case Vulcanizer rigged with Union Stove for Kerosene.

Two-Case Vulcanizer rigged with No. 1 Hot-Blast Stove for Kerosene.

simple but heretofore unthought of device, which greatly facilitates the handling of the vulcanizer, especially when hot. Thus, the boiler can be opened for the removal of one case and the placing of another. The nut of the clamping-bolt is loosened a little at a time, allowing the steam to escape gradually until the bolt is released, when the bar can be thrown back and the top of the boiler raised. The bail is also useful in removing the boiler from the jacket, in tightening or loosening the screw-bolt when closing or opening the boiler, and at all times when the boiler is to be lifted. When not in use it is readily removed.

The thermometers used are carefully and reliably made for this special purpose. The metallic frame is screwed upon an iron cup-shaped seat, containing mercury, forming a "mercury bath."

The whole apparatus is carefully made of the best materials, and we believe it will prove not only the most convenient but the most durable vulcanizer on the market.

# Steam-Gauge for Vulcanizers.

We have adopted a reliable Steam-Gauge, to which is connected a condensing-chamber, with pipes so arranged as to form a trap. Above this trap is placed a safety-disk attachment.

This Gauge can be placed on any of the modern vulcanizers having a blow-off or safety attachment, by simply removing the cap of same and screwing on the Gauge.

Price, complete . . . . . \$7.50



## PRICE-LIST OF THE MANN VULCANIZERS, WITHOUT STEAM-GAUGE.

Two-Case Vulcanizer, for Alcohol	\$18.00
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“ “ “ “ Kerosene, with Union Stove	18.50
“ “ “ “ “ No. 1 Hot-Blast Stove	20.75
Three “ “ “ “ Alcohol	20.00
“ “ “ “ Gas	20.00
“ “ “ “ Kerosene, with Union Stove	20.50
“ “ “ “ “ No. 1 Hot-Blast Stove	22.75

Steam-Gauge adds \$7.00 to these prices.

## PARTS OF VULCANIZERS.

Thermometer in Case, complete	\$1.75
Thermometer Tube and Scale	.75
Blow-Off Safety Valve	1.50
Cap of “ “ separately	.50
Stud of “ “ “	.50
Disks for “ “ “	per pkg. .50
Packing “ “ “	“ strip .10
“ Duster (Soap-Stone)	“ pkg. .10
Wrench for Clamping-nut.	.15
“ “ Flask	.10
Alcohol Stand	.40
Alcohol Lamp	.75
Jacket, two or three Case	.40
Gas-Burner	.75
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SESSION 1887-'88.

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At stated times during the Annual Sessions a number of the Corps of Clinical Instructors will hold Clinics and deliver Clinical Lectures.

Each year since its organization has added to the reputation and prosperity of this University Dental School, until now its graduates, in almost every part of the civilized world, are meeting with the success that ability will ever command. The past session was the most successful one in number of matriculates ever held; and visiting dentists from all parts of this country have expressed themselves as being astonished and gratified at the ability shown by the students when operating upon patients in the Infirmary. Forming one of the departments of one of the oldest Universities in this country, its diploma is everywhere recognized and honored.

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The Dental Infirmary and Laboratory Building is one of the largest and most complete structures of the kind in the world. The Infirmary is lighted by forty-seven large windows, and is furnished with the most improved operating chairs.

The Dental Infirmary and Laboratory are open daily (except Sundays) during the entire year for the reception of patients; and the practice for dental students has increased to such an extent that all the students during the past session have had an abundance of practical work in both operative and prosthetic dentistry—the Record Books showing to the credit of many of them hundreds of gold fillings inserted for Infirmary patients, besides other operations. This means for practical instruction has already assumed such large proportions that the supply has been beyond the needs of the large classes in attendance during the past sessions.

The exceedingly large number of patients for the extraction of teeth affords ample facilities for practical experience to every student.

In addition to the facilities afforded by this institution for a thorough course of instruction in the theory and practice of dentistry, the clinics in the University Hospital enable the Dental equally with the Medical Students to become familiar with the diseases and operations of Practical Surgery; excis-



ions of jaw, partial or entire; tumors, cancerous or benign, of various parts of the buccal cavity; plastic operations for the restoration of cheek, lips, etc., may be mentioned as having been before the class during the year. The induction of anesthesia by means of different agents—ether, chloroform, bromide of ethyl, nitrous oxide gas, all being used in the clinics—cannot fail to be of use to the student of Oral Surgery. Junior as well as Senior students are afforded every opportunity for practical instruction in both operative and mechanical dentistry.

The Lecture Halls in the University Buildings are large and well lighted; and every facility will be afforded for practical and theoretical dental instruction. Demonstrations in Anatomy, Physiology, and Pathology, (for which an abundance of material is furnished free of charge), also form an important part of the regular course. The Dissecting Room is large, well ventilated and lighted, and the Demonstrator of Practical Anatomy passes much of his time in assisting the students and directing their labors. **Dissecting Material is furnished in abundance, free of charge.**

**Qualifications for Graduation:** The candidate must have attended two full courses of lectures of five months each in different years at the Regular or Winter Sessions in this institution. The following, however, will be considered as an equivalent to an attendance on one course of lectures in this College:—One course in any reputable Dental College; graduation in a reputable Medical College with one year of dental pupillage in a dental infirmary. The student meeting either of the above requirements will have the privilege of presenting himself as a candidate for graduation at the end of but one Course of Lectures. The matriculant must have a good English education; a diploma from a reputable literary institution, or other evidence of literary qualification will be received instead of a preliminary examination. All students, both juniors and seniors, have equal advantages in operative and mechanical dentistry in this institution throughout every session.

**Graduation in Medicine:** Graduates of the Dental Department of the University of Maryland are required to attend but one session at the University School of Medicine prior to presenting themselves as candidates for the degree of "Doctor of Medicine." (See Catalogue.)

The Regular or Winter Session will begin on the 1st day of October, 1886, and will terminate about the 1st of March, 1887.

The Summer Session, for practical instruction, will commence in March, and continue until the regular Session begins. Students in attendance on the Summer Session will have the advantages of all the daily Surgical and Medical Clinics of the University.

The fees for the Regular Session are \$100, Demonstrators' Fees included; Matriculation Fee, \$5; Diploma Fee, for candidates for graduation, \$30; Dissecting Ticket, \$10.

For Summer Session, no charge to those who attend the following Winter Session.

**Beneficiary.**—A Beneficiary student will be received from each State, on the recommendation of the State Dental Society, on the payment of half of the tuition fees. Board can be obtained at from \$3.50 to \$5 per week, according to quality.

The University Prize and a number of other Prizes will be specified in the annual Catalogue.

Students desiring information and the annual Catalogue will be careful to give full address and direct their letters to

**F. J. S. GORGAS, M.D., D.D.S.,**

*Dean of the Dental Department of the University of Maryland.*

**259 N. Eutaw Street, Baltimore, Md.**

## **VANDERBILT UNIVERSITY.**

### **DEPARTMENT OF DENTISTRY.**

**JAMES C. ROSS, D.D.S.,**

*Emeritus Professor of Operative Dentistry and Dental Hygiene.*

**WM. H. MORGAN, M.D., D.D.S.,**

*Professor of Clinical Dentistry, Oral Surgery, and Pathology.*

**ROBERT R. FREEMAN, M.D., D.D.S.,**

*Professor of Mechanical and Corrective Dentistry.*

**THOS. A. ATCHISON, M.D.,**

*Professor of Materia Medica and Special Therapeutics.*

**D. R. STUBBLEFIELD, A.M., M.D., D.D.S.,**

*Professor of Chemistry and Metallurgy.*

**AMBROSE MORRISON, M.D.,**

*Professor of Anatomy and Physiology.*

**ORVILLE H. MENEES, M.D.,**

*Professor of Oral Surgery, Histology, and Pathology.*

**HENRY W. MORGAN, M.D., D.D.S.,**

*Professor of Operative Dentistry and Dental Hygiene.*

**JOHN H. KELLEY,**

*Lecturer on Analytical Chemistry.*

#### **DEMONSTRATORS.**

**GILBERT F. BROWN, D.D.S.,** Demonstrator of Operative and Mechanical Dentistry.

**A. C. STRICKLAND, D.D.S.,** Assistant Demonstrator of Operative and Mechanical Dentistry.

**CHARLES L. EVES, M.D.,** Demonstrator of Anatomy.

**T. H. WOOD, M.D.,** Assistant Demonstrator of Anatomy.

The preliminary course begins first Monday in September. The regular term begins first day of October, and the Spring term first Monday in March.

#### **FEES.**

Matriculation . . . . .	\$5.00	Prof. Tickets . . . . .	\$50.00
Diploma . . . . .	25.00	Demonstrator of Anatomy . . . . .	10.00

The Department will conform to the requirements of the National Association of Dental Faculties. For further information, address

**W. H. MORGAN, M.D., D.D.S., Dean,**

**12 N. High Street, Nashville, Tenn.**

# UNIVERSITY OF PENNSYLVANIA.

## DENTAL DEPARTMENT.

### FACULTY.

WILLIAM PEPPER, M.D., LL.D., Provost of the University, and *ex-officio* President of the Faculty.

CHARLES J. ESSIG, M.D., D.D.S., Professor of Mechanical Dentistry and Metallurgy.

EDWIN T. DARBY, M.D., D.D.S., Professor of Operative Dentistry and Dental Histology.

JAMES TRUMAN, D.D.S., Professor of Dental Pathology, Therapeutics, and Materia Medica.

JOSEPH LEIDY, M.D., LL.D., Professor of Anatomy.

THEODORE G. WORMLEY, M.D., LL.D., Professor of Chemistry.

EDWARD T. REICHERT, M.D., Professor of Physiology.

ROBERT HUEY, D.D.S., Lecturer on Operative Dentistry.

LOUIS JACK, D.D.S., Lecturer on Operative Dentistry.

Students of the Dental Department have access without additional charge to all the other lectures and clinics in the Medical Department.

Surgical Clinics at University Hospital twice a week; at Philadelphia Hospital, contiguous to the grounds of University, Wednesday and Saturday.

### DEMONSTRATORS.

WILLIAM DIEHL, D.D.S., Demonstrator of Operative Dentistry.

GEO. G. MILLIKEN, D.D.S., 1st Assistant Demonstrator of Operative Dentistry.

JAMES E. LODER, D.D.S., 2d Assistant Demonstrator of Operative Dentistry.

JOSEPH W. WHITE, D.D.S., 3d Assistant Demonstrator of Operative Dentistry.

J. JUDSON EDWARDS, D.D.S., Demonstrator of Mechanical Dentistry.

HARRY B. MCFADDEN, D.D.S., 1st Assistant Demonstrator of Mechanical Dentistry.

AMBLER TEES, JR., D.D.S., 2d Assistant Demonstrator of Mechanical Dentistry.

JOHN B. DEEVER, M.D., Demonstrator of Anatomy.

JOHN MARSHALL, M.D., Demonstrator of Practical Chemistry.

### CLINICAL INSTRUCTORS.

DR. C. S. BECK.

DR. E. H. NEALL.

DR. R. R. UNDERWOOD.

DR. H. C. LONGNECKER.

DR. H. C. REGISTER.

DR. I. F. WARDWELL.

DR. W. G. A. BONWILL.

DR. GEO. W. KLUMP.

DR. J. A. WOODWARD.

DR. W. R. MILLARD.

DR. R. H. SHOEMAKER.

The appointments of the Lecture-Rooms, Operating-Room, and Laboratories are the most complete in America.

The belief entertained when the Dental Department was started that the facilities for obtaining a supply of clinical patients were ample, has been fully realized, and owing to the unequalled accommodations and appointments of the new operating-room, the daily applications are now largely in excess.

Laboratory instruction of each student, not only in Practical Dentistry but also in Practical Chemistry, forms a prominent feature in the Department of Dentistry.

### FEES.

Matriculation Fee . . . . .	\$5.00	Dissecting Fee . . . . .	\$10.00
Fee for One Course of Lectures	100.00	Graduation Fee . . . . .	30.00

Board can be obtained at from five to eight dollars per week, according to location and accommodations. In locations near the college, students generally pay about five dollars per week.

## University of Pennsylvania.—Dental Department.

The dental department possesses the means for thorough training, both theoretical and practical, not surpassed, it is believed, by any other institution. The operating-room is 151 feet in length by 46 feet in width, and lighted by windows on all sides. In front of each window is placed a Morrison Chair, a handsome nickel-plated movable bracket, and a neat walnut table. Battery-wires are arranged to a number of the chairs for the use of electric pluggers.

The Mechanical Laboratory is supplied with all the modern appliances, and is under the care of an able and experienced mechanic. Special clinics will be given in continuous-gum work by the professor of mechanical dentistry and metallurgy.

The extensive Chemical Laboratories are under the charge of a demonstrator well qualified to meet all the requirements of his position.

The Dissecting-Room is large, well lighted, thoroughly ventilated, and is furnished with ample material for the successful prosecution of anatomical studies.

### THE REGULAR OR WINTER SESSION.

The session will commence on Monday, October 3, and continue until the last of April. The number of lectures per week, with a synopsis of the various branches taught, will be found in the General Catalogue.

In order to facilitate work in the practical departments, and to fully employ the student's time, the regular winter sessions are so arranged that the first-course student is required to devote the morning hours equally between *dental and chemical laboratory work*.

The second-year student, having passed in chemistry and materia medica, is not required during his second course to attend the lectures upon them; thus he has the entire forenoon of each day for practical dental work.

It is the desire of the Faculty to offer every opportunity for the acquirement of practice in operative and mechanical dentistry, and as many large operations in the mouth require the morning light, and more time in their performance than an afternoon affords, permission will be given to the second-course student to devote the morning hours to this object when required.

It is believed that this plan of *grading the course*, and of affording the first-year student an opportunity of coming forward for examination in the branches of chemistry and materia medica, will not only prove an economical arrangement of his time, but will really facilitate his labors in the acquirement of knowledge in the remaining branches.

### PLAN OF EXAMINATIONS.

Attendance upon two regular winter courses of lectures will be required before the final examination for the degree of Doctor of Dental Surgery.

At the close of the first year, examinations are held in *chemistry and materia medica*. If the student is not qualified, a second examination is afforded him at the beginning of the next winter session.

The final examination is in *anatomy, physiology, operative dentistry, mechanical dentistry, metallurgy, and dental pathology and therapeutics*.

Students who have attended one full term in another dental school recognized by the Faculty will be admitted to the graduating class upon presentation of the required certificate.

Students holding a medical diploma will be admitted to the Senior Class, but will be required to spend a year in the study of practical Dentistry in the Operative and Mechanical Departments, the year to include the regular winter's course of lectures.

Students who have attended but one course in a medical college will be required to take two winter courses in this Department.

A preliminary examination will be required for entrance to the first or Junior year. The requirements will be a good English education.

Students who have certificates properly attested from colleges or other schools of reputable character will be accepted without examination.

JAMES TRUMAN, D.D.S.,

Secretary of the Dental Faculty, 3249 Chestnut Street,

PHILADELPHIA.

In directing letters addressed to this department, for catalogues or other information, correspondents are requested to write the word Secretary (not Dean) under the name.



# The Baltimore College of Dental Surgery.

Chartered by the Legislature of Maryland in 1839.

## THE OLDEST DENTAL COLLEGE IN THE WORLD.

### FACULTY.

JAMES B. HODGKIN, D.D.S., Professor of Pathology and Therapeutics.  
RICHARD B. WINDER, M.D., D.D.S., Professor of Dental Surgery and Special Anatomy.  
M. WHILLDIN FOSTER, M.D., D.D.S., Professor of Dental Mechanism and Metallurgy.  
JOHN H. COYLE, D.D.S., Professor of Operative Dentistry and Dental Materia Medica.  
THOMAS S. LATIMER, M.D., Professor of Physiology.  
JAMES E. LINDSAY, M.D., Professor of Chemistry.  
CHARLES F. BEVAN, M.D., Professor of Anatomy.  
OSCAR J. COSKERY, M.D., Clinical Professor of Oral Surgery.  
RICHARD GUNDRY, M.D., Professor of Materia Medica.

### CLINICAL INSTRUCTORS.

#### OPERATIVE CORPS.

CORYDON PALMER, D.D.S., Ohio.  
E. PARMLY BROWN, D.D.S., N. Y.  
A. L. NORTROP, D.D.S., N. Y.  
CHAS. R. BUTLER, D.D.S., Ohio.  
E. L. HUNTER, D.D.S., N. C.  
W. W. WALKER, D.D.S., N. Y.  
H. A. PARR, D.D.S., N. Y.

#### MECHANICAL CORPS.

JOHN ALLEN, D.D.S., N. Y.  
CORYDON PALMER, D.D.S., Ohio.  
E. M. FLAGG, D.D.S., N. Y.  
R. B. DONALDSON, D.D.S., D. C.  
JOHN H. MEYER, D.D.S., N. Y.

### DEMONSTRATORS.

WILLIAM B. FINNEY, D.D.S., Demonstrator of Operative Dentistry.  
R. BAYLY WINDER, D.D.S., Demonstrator of Mechanical Dentistry.

### ASSISTANT DEMONSTRATORS.

B. HOLLY SMITH, M.D., D.D.S. | WILLIAM G. FOSTER, D.D.S.  
J. W. CHAMBERS, M.D., Demonstrator of Dentistry.  
J. H. BRANHAM, M.D., Assistant Demonstrator of Anatomy.

The Baltimore College of Dental Surgery, the first and for many years the only Dental School, offers facilities for the study of Dentistry proper, such as age and experience only can give. Its immense museum, complete apparatus, large and well-arranged building, and carefully-studied curriculum give to its students great advantages and opportunities, both theoretical and practical, while its age gives its Diploma a dignity far out-ranking all other Colleges—a diploma honorably represented in all civilized countries, and held by the most distinguished members of the Dental Profession.

The fact that Dentistry must be *practically taught* is fully recognized, the *College Infirmary*, a most complete, large, and handsome Hall, being daily filled with clean and respectable patients, of a class nearly equal to those of the average dentist. *This Infirmary is open all the year*, students paying an entrance fee which is deducted from those of the regular succeeding course.

The session begins Oct. 1, closing in March. The first month is devoted mainly to Practical Dentistry—the regular lectures commencing Nov. 1. A large corps of Demonstrators, always present, put in actual practice the teachings of all lecturers on Dentistry—leaving nothing undemonstrated. *All methods are fully taught*, all appliances and apparatus used; the making of instruments and the most elaborate gold and continuous-gum work, and all the cases arising in ordinary practice, with many which are rarely seen, carefully demonstrated.

The College has formed an alliance with the College of Physicians and Surgeons by which its students are privileged to attend all lectures and clinics. The patients of this medical school numbered last year over 40,000.

Graduates of the Baltimore College of Dental Surgery are required to attend but *one session* at the College of Physicians and Surgeons prior to presenting themselves as candidates for the degree of M.D. (See Catalogue.) In accordance with the resolution adopted by the National Association of Dental Faculties in the City of New York on the 4th of August, 1884, and which goes into effect for the session of 1885 and 1886, the qualifications for entering the Junior Class are a preliminary examination in the ordinary English branches.

**TERMS OF GRADUATION.**—Attendance on two Winter courses of lectures in this College; as equivalent to one of these we accept *one course* in any reputable Dental College. *Graduates in Medicine* who have attended one Winter Course in this College and have passed one year, inclusive of the Winter Course, in the practical work of the Infirmary and Laboratory, will be permitted to present themselves for graduation.

**BENEFICIARY STUDENTS.**—Each State Dental Society is privileged to send one Beneficiary Student to this College at one-half the regular tuition fees. This has been for some years an established feature of this College.

**FEES.**—Matriculation (paid once only), \$5.00. Tuition fees, \$100.00. Diploma fee, \$30.00. Dissecting fee, \$10.00.

Students corresponding with the Dean will please be careful to give full address, and direct their letters to

Prof. R. B. WINDER, Dean,

No. 140 Park Avenue, Baltimore, Md.

NOTE.—The officers of the Board of Visitors are, Fred. A. Levy, N. J., president; W. W. Walker N. Y., vice-president; R. Finley Hunt, D. C., secretary.

# Pennsylvania College of Dental Surgery,

Twelfth Street, between Market and Arch, corner Filbert.

## THIRTY-FIRST ANNUAL SESSION, 1887-88.

### FACULTY AND AUXILIARY INSTRUCTORS.

J. EWING MEARS, A.M., M.D., Professor of Anatomy and Surgery.  
C. N. PEIRCE, D.D.S., Professor of Dental Physiology, Dental Pathology, and Operative Dentistry.  
WILBUR F. LITCH, M.D., D.D.S., Professor of Prosthetic Dentistry, Materia Medica, and Therapeutics.  
HENRY LEFFMANN, M.D., D.D.S., Professor of Chemistry and Metallurgy.  
ALBERT P. BRUBAKER, M.D., D.D.S., Professor of Physiology and General Pathology.

ALONZO P. BEALE, D.D.S., Demonstrator of Prosthetic Dentistry.  
PERCIVAL E. LODER, M.D., D.D.S., Demonstrator of Anatomy.  
J. M. BARSTOW, D.D.S., Demonstrator of Carving Block Teeth and Continuous-Gum Work.  
A. G. BENNETT, D.D.S., Chief of the Clinics and Demonstrator of Operative Dentistry.  
I. N. BROOMELL, D.D.S., Demonstrator of Prosthetic Dentistry.  
G. L. S. JAMESON, D.D.S., Demonstrator of Operative Dentistry.  
ALEX. P. LONG, D.D.S., Demonstrator of Operative Dentistry.  
JAMES A. KYNER, Ph.G., Demonstrator of Chemistry.  
J. HOWARD GASKILL, D.D.S., Demonstrator of Prosthetic Dentistry.  
EDWIN FISCHER, D.D.S., Demonstrator of Operative Dentistry.  
G. CARROW CHANCE, D.D.S., Demonstrator of Operative Dentistry.  
G. W. WARREN, D.D.S., Demonstrator of Operative Dentistry.

### CLINICAL INSTRUCTORS.

Dr. F. M. DIXON,	Dr. C. S. STOCKTON,	Dr. JOHN B. WOOD,
Dr. J. N. FARRAR,	Dr. T. F. CHUPEIN,	Dr. C. E. FRANCIS,
Dr. W. G. A. BONWILL,	Dr. W. H. TRUEMAN,	Dr. URIAH KIRK,
Dr. A. L. NORTROP,	Dr. J. HAYHURST,	Dr. E. C. BAXTER,
Dr. C. PALMER,	Dr. J. G. TEMPLETON,	Dr. A. H. BROCKWAY,
Dr. R. H. SHOEMAKER,	Dr. W. R. MILLARD,	Dr. A. B. ABELL,
Dr. CHAS. F. BONSALE,	Dr. R. HOLLENBACK.	

This College has accepted the requirements of the National Association of Dental Faculties with regard to admission and graduation of students. (See announcement for 1887-8, which can be procured from the Dean.)

### THE SPRING AND FALL SESSIONS.

*The Spring Course* commences on the second Monday in March and continues until the first of June. Fee, \$50, which will be credited upon the fee for the regular session.

*The Fall Course* will commence on Monday, September 12th, and continue until the first of October, and will be free to those who matriculate for the regular session.

Attendance upon the Spring and Fall Courses will be deemed equivalent to the term of pupillage under a private preceptor.

### THE REGULAR SESSION

Will commence on Monday, October 3d, and continue until the first of March ensuing. Twenty lectures will be delivered each week on the various branches taught.

### CLINICAL PRACTICE.

Lecture hours excepted, general clinical practice is available for the student continuously through the day. Competent instructors are always present.

### GRADUATION IN MEDICINE.

By an arrangement with Jefferson Medical College, such students as may desire to do so can, if found qualified, obtain the two degrees, in Dentistry and Medicine, in three years. Students desiring to graduate in medicine are required to notify the Dean of their intention at the beginning of their second course.

### FEES.

Matriculation (paid but once)	. . . . .	\$5.00
For the Course (Demonstrators' Ticket included)	. . . . .	100.00
Dissecting Fee (optional)	. . . . .	10.00
Diploma Fee	. . . . .	30.00

Board can be obtained at from \$4.00 to \$6.00 per week.

The Instruments and Tools required can be procured for from \$35.00 to \$45.00. This sum does not include the price of dental engine.

For further information, address

C. N. PEIROE, Dean, 1415 Walnut St., Philadelphia.

# UNIVERSITY OF CALIFORNIA, DENTAL DEPARTMENT.

Toland Hall, Stockton Street, between Chestnut and Francisco Streets,

SAN FRANCISCO, CAL.

## FACULTY.

E. S. HOLDEN, LL.D., President of the University and ex-officio President of the Faculty.  
 JOSEPH LE CONTE, M.D., LL.D., Honorary Professor of Biology.  
 S. W. DENNIS, M.D., D.D.S., Professor of Operative Dentistry and Dental Histology.  
 C. L. GODDARD, A.M., D.D.S., Professor of Mechanical Dentistry.  
 M. W. FISH, M.D., Professor of Physiology.  
 W. E. TAYLOR, M.D., Professor of Principles and Practice of Surgery.  
 A. L. LENGFELD, M.D., Professor of Chemistry and Materia Medica.  
 WILLIAM B. LEWITT, M.D., Professor of Anatomy.  
 MAURICE J. SULLIVAN, D.D.S., Professor of Dental Pathology and Therapeutics.

## DEMONSTRATORS.

J. SCHNEIDER, D.D.S., } Demonstrators of Operative Dentistry.  
 F. J. SAXE, A.M., D.D.S., }  
 CHARLES BOXTON, D.D.S., } Demonstrators of Mechanical Dentistry.  
 M. F. GABBS, D.D.S., }

## CLINICAL INSTRUCTORS.

H. C. DAVIS, L.D.S.	H. J. PLONTEAUX, D.D.S.	A. F. McLAIN, M.D., D.D.S.
L. L. DUNBAR, D.D.S.	W. E. PRICE, D.D.S.	THOMAS MORFFEY, D.D.S.
C. W. HIBBARD, D.D.S.	MAX SICHEL.	JNO. RABE, D.D.S.
B. W. HAINES, M.D., D.D.S.	W. B. KINGSBURY.	L. VAN ORDEN, M.D.
		W. WOOD.

N.B.—Demonstrators and Clinical Instructors appointed annually.

March 7, 1887, the Dental Department of the University of California commences its sixth annual session. From the very beginning it has succeeded far beyond the fondest hopes of its founders and the sanguine expectations of its friends. The number and character of its students have exceeded the anticipations of both founders and friends. While we feel fully justified in saying that from the organization of the Dental Department of the University of California the facilities and opportunities for securing a dental education in it have been equal to any other similar institution of learning in the country, we are equally aware that the profession and the people would justly have more confidence in the scholarship and capabilities of graduates of a dental college that requires three years' study, including two terms of nine months each, than they would have in those of graduates from a college that requires two terms of but four or five months' attendance at most, with a preliminary term of a month or two, the attendance upon which is optional with the student. This plan of a nine months' term gives longer time for study and more for practical instructions and less crowding of both. We are glad to be able to say that the more intelligent students and those who are actuated by the best motives favor the step in advance. For the course of study, we refer to our Annual Announcement, which will be furnished anyone upon application.

Surgical and medical clinics are held at the hospital three times a week, to which the dental students are admitted with all the privileges accorded to medical students. The Lecture-Rooms, Operating-Rooms, and Laboratories are commodious, and their appointments complete,—not excelled by any college of the kind in the country.

REQUIREMENTS FOR ADMISSION.—Every candidate for admission must be eighteen years of age, and must present to the Faculty satisfactory evidence of a good moral character. Unless already a matriculate of the University of California, or of some other recognized college or university, or a graduate of some recognized academy or high school, or holding a teacher's certificate, he must pass an examination in Arithmetic, Geography, English Grammar and Composition, U. S. History, Natural Philosophy, and Chemistry. The preliminary examination for the session of 1887 will be held March 4th. He shall subscribe to Article II., Section 3, of the Code of Ethics of the American Dental Association.\*

JUNIOR EXAMINATION.—At the end of the Junior year students will be examined in Anatomy, Physiology, Chemistry (or Materia Medica), Histology, and Mechanical Dentistry, and those who are qualified will receive certificates of admission to the Senior Class.

REQUIREMENTS FOR GRADUATION.—The candidate for the degree of Doctor of Dental Surgery must have attained the age of twenty-one years. He shall have passed a satisfactory examination, both oral and written,—a written examination being substituted in this college for a thesis. He shall have studied dentistry three years, including two courses of lectures, one of which shall be at this institution. Graduates in medicine may apply for the degree of D.D.S., after having had two full years of practical instruction or experience in dentistry, one year of which, including one course of lectures, must be spent in the Dental Department of the University of California. After these requirements have been complied with, upon recommendation of the Faculty and approval by the Board of Regents, the candidate shall receive the degree of Doctor of Dental Surgery.

## FEES.

Matriculation (paid but once) . . . . .	\$5.00	Tuition, third year . . . . .	Free
Tuition, first year . . . . .	120.00	Demonstrator of Anatomy's Fees, each year . . . . .	\$10.00
“ second year . . . . .	120.00	Diploma . . . . .	30.00

C. L. GODDARD, Dean,

131 Post St., San Francisco, Cal.

N.B.—The Medical and Dental Colleges of the University of California, as well as other medical colleges, unlike similar institutions in the Eastern States, hold their sessions during the Spring, Summer, and Fall months.

\* The object of this requirement is to prevent students committing unprofessional acts during their college course.



# PHILADELPHIA DENTAL COLLEGE AND HOSPITAL OF ORAL SURGERY.

## TRUSTEES.

**President,**  
Hon. JAMES POLLOCK,  
Ex-Governor of Pennsylvania

**Secretary,**  
CHAS. P. TURNER, M. D.

PETER F. ROTHERMEL,  
WILLIAM DULTY,  
HON. JOHN K. VALENTINE,

WM. H. MACDOWELL,  
GEO. J. ZIEGLER, M.D.,  
COLSON HIESKELL,  
W. B. ATKINSON, M.D.,

L. TURNBULL, M.D.,  
REV. JOHN S. SANDS,  
C. A. KINGSBURY, M.D., D.D.S.  
J. E. GARRETSON, M.D., D.D.S.

## FACULTY.

HENRY MORTON, A. M., Ph. D.,  
Emeritus Professor of Chemistry.

C. A. KINGSBURY, M.D., D.D.S.,  
Emeritus Professor of Dental Histology and Operative Dentistry.

S. H. GUILFORD, A.M., D.D.S.,  
Professor of Operative and Prosthetic Dentistry.

J. FOSTER FLAGG, D.D.S.,  
Professor of Dental Pathology and Therapeutics.

HENRY I. DORR, M.D., D.D.S.,  
Professor of Clinical Dentistry and Anæsthetics.

S. B. HOWELL, M.D., D.D.S.,  
Professor of Chemistry and Materia Medica.

THOMAS C. STELLWAGEN, M.D., D.D.S.,  
Professor of Physiology.

JAMES E. GARRETSON, M.D., D.D.S.,  
Professor of Anatomy and Surgery. Surgeon to the Oral Clinic.

S. ELDRED GILBERT, D.D.S.,  
Demonstrator of Clinical Dentistry.

L. GREENBAUM, D.D.S.,  
Demonstrator of Chemistry and Materia Medica.

P. F. STRUPPLER, D.D.S.,  
Demonstrator of Clinical Dentistry.

W. XAVIER SUDDUTH, M.D., D.D.S.,  
Demonstrator of Dental Histology.

HENRY C. BOENNING, M.D.,  
Demonstrator of Anatomy.

## CLINICAL INSTRUCTORS.

WILLIAM C. HEAD, D.D.S.,

GEORGE W. ELLIS, M.D., D.D.S., C. E. FRANCIS, D.D.S.,

JAMES McMANUS, D.D.S.,

CHARLES E. PIKE, D.D.S.,

W. G. A. BONWILL, D.D.S.,

H. C. REGISTER, M.D., D.D.S.,

JOSEPH P. WYMAN, D.D.S.,

WM. CARR, M.D.,

J. L. EISENBREY, D.D.S.,

JAMES MARTIN, D.D.S.,

GEO. S. CARDWELL, D.D.S.,

AMBLER TEES, D.D.S.,

JOS. R. C. WARD, D.D.S.

Spring Courses commence March 1st. Fall Courses commence September 1st. Winter Courses commence October 1st.

Fees, \$100 per year.

Announcements affording all particulars are to be obtained by addressing

Dr. JAMES E. GARRETSON, Dean of the Faculty,  
1537 Chestnut Street, Phila., Pa.

# Harvard University, Dental Department.

BOSTON, MASS., 1887-88.

## FACULTY.

CHARLES W. ELIOT, LL.D., President.  
THOMAS H. CHANDLER, D.M.D., Dean and Professor of Mechanical Dentistry.  
DAVID W. CHEEVER, M.D., Professor of Surgery.  
HENRY P. BOWDITCH, M.D., Professor of Physiology.  
THOMAS DWIGHT, M.D., Professor of Anatomy.  
THOMAS FILLEBROWN, M.D., D.M.D., Professor of Operative Dentistry.  
WILLIAM B. HILLS, M.D., Professor of Chemistry.  
CHARLES A. BRACKETT, D.M.D., Professor of Dental Pathology and Therapeutics.  
GEORGE F. GRANT, D.M.D., Instructor in Treatment of Cleft Palate and Cognate Diseases.  
CHARLES WILSON, D.M.D., Instructor in Orthodontia.  
EDWARD C. BRIGGS, M.D., D.M.D., Instructor in Dental Materia Medica.

## OTHER INSTRUCTORS.

HORATIO C. MERIAM, D.M.D., Instructor in Operative Dentistry.  
M. H. RICHARDSON, M.D., Demonstrator of Practical Anatomy.  
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DANIEL F. WHITTEN, D.M.D., Instructor in Operative Dentistry.  
WILLIAM PARKER COOKE, D.M.D., Instructor in Operative Dentistry.  
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JOSEPH E. WAITT, D.M.D., Demonstrator of Mechanical Dentistry.  
J. E. STANTON, M.D., D.M.D., Instructor in Oral Pathology and Anatomy.  
EDWIN L. SHATTUCK, D.M.D., Demonstrator of Operative Dentistry.

The Nineteenth Annual Session of this school begins Sept. 29, 1887, and ends June 27, 1888, with a recess of one week at Christmas, and another in April, making a school-year of nine months of practically continuous work.

*General Anatomy*, by Dr. Thomas Dwight; *Physiology*, by Dr. H. P. Bowditch; and *General Chemistry*, by Dr. Wm. B. Hills, together with ample dissecting under able demonstrators, are the studies of the first year, the dental students taking the whole first-year course of the Harvard Medical School, which is acknowledged to be the most thorough medical course in America. The studies for the second year are Operative and Mechanical Dentistry, Dental Materia Medica and Therapeutics, Oral Surgery, and Surgical Pathology. Attention is called to the fact that *eighteen months* of progressive instruction compose the required two years in the school. Also, that the second year does not repeat the work of the first, but covers entirely different ground. In other schools the work of the second term is usually a repetition of that of the first.

In the Operative and Mechanical Departments measures are taken to keep fully abreast of the times, the great number of patients who apply for operations giving full opportunity to the student for practicing and becoming familiar with every phase of dentistry. Lectures and abundant clinics furnish the theory of his profession, while able assistants and demonstrators watch every step of his progress, aiding where help is needed, and advising where advice only is called for. All candidates for admission must present a degree in Letters, Science, or Medicine, or pass an examination in English composition, and also in Physics (such as may be had from Balfour Stewart's "Elements of Physics.") For time and place of this examination, see announcement.

At the end of each year written examinations test the student's knowledge and he must pass satisfactorily in a majority of the first-year studies before he can pass on to the second year's class.

To those wishing to take the medical degree the first year of this school is allowed in the Medical School of the University, after passing the required entrance examinations, and also in every other medical school in the land.

The University Degree, D.M.D. (*Dentariæ Medicinæ Doctor*), is conferred upon all who fulfill the requirements.

The diploma is accepted by the English Board of Registration under the new Dental Act, so that graduates of this school can practice dentistry in Great Britain without further examination.

Graduates of recognized dental schools will be admitted to the courses of Operative and Mechanical Dentistry on payment of \$50 each, or \$100 for both, for the whole or any portion of the academic year.

## FEES.

There are no fees for matriculation, nor for the diploma, nor for the demonstrators. For the first year a student is a member of the school the fee is \$200, payable in two installments of \$120 and \$80; for the second year, \$150, in two payments of \$100 and \$50; for any subsequent year, \$50. For information, address

THOMAS H. CHANDLER, Dean,

Hotel Bristol, Cor. Clarendon and Boylston Sts., Boston, Mass.

# CHICAGO COLLEGE OF DENTAL SURGERY

Wabash Avenue and Madison Street,

CHICAGO, ILL.

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JAMES STEWART, D.D.S., Assistant Demonstrator of Anatomy.

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## FEES FOR THE REGULAR WINTER COURSE.

The Fees are payable in advance.

Matriculation Fee . . . . .	\$5.00
Tickets for the Course . . . . .	75.00
Demonstration of Anatomy, including material . . . . .	10.00
Chemical Laboratory . . . . .	5.00
Final Examination Fee—not returnable . . . . .	25.00

## FEES FOR THE ANNUAL SPRING COURSE.

Matriculation Fee (good till the following April) . . . . .	\$5.00
Lecture Tickets . . . . .	20.00

(This amount will be deducted from the fees of the next following winter session.)

Fee for Practical Chemistry . . . . .	\$5.00
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Instruments and appliances for clinical departments will cost from \$25 to \$40.

Graduates of the College are admitted on payment of the matriculation fee only; graduates of other regular dental colleges on payment of matriculation fee and ten dollars.

Board, including light and fuel, can be obtained at a convenient distance from the College, at from four to six dollars a week.

The Annual Course of lectures will begin Monday, October 4, 1886, and continue until March 31 1887.

The Spring Course will begin Tuesday, April 5, 1887,—the week following Commencement Day,—and terminate on the 22d of the following June.

Letters of inquiry should be addressed to

Dr. TRUMAN W. BROPHY, Dean,

96 State St., Chicago, Ill.



# BOSTON DENTAL COLLEGE.

BOSTON, MASS.

1887-88.

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ALBERT N. BLODGETT, M.D., Professor of Pathology and Therapeutics.  
FRANCIS A. HARRIS, A.M., M.D., Professor of Principles and Practice of Surgery.  
WILLIAM BARKER, D.D.S., Professor of Operative Dentistry.  
C. P. PENGRA, Ph.C., M.D., Professor of Dental Histology and Microscopy.

FRANCIS B. PATTEN, LL.B., *Lecturer on Medical Jurisprudence.*  
HENRY A. BAKER, D.D.S., *Lecturer on Oral Deformities.*  
EDWARD W. BRANNIGAN, D.D.S., *Demonstrator in Charge.*

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DAVID ANGELO WHITTLE, *Demonstrator in charge of Mechanical Department.*  
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STEPHEN B. SHARPLES, S.B., *Librarian.*

The year begins on the Thursday following the first Wednesday in October, and ends on the fourth Wednesday in June.

It is the object of the Faculty to present a complete course of instruction in the theory and practice of Dentistry, and for this purpose a well-appointed laboratory and infirmary are provided, at which there is an ample number of patients, insuring to all students abundant opportunities for operating at the chair and becoming by actual practice familiar with all the operations demanded of the Dentist.

The Laboratory and Operating Room will be open at 9 o'clock A. M. Demonstrators will be present daily during working hours.

Students who began their professional studies elsewhere may be admitted to advanced standing. No student may advance with his class or be admitted to advanced standing until he has passed the required examinations on the studies of the previous year.

Every candidate for the degree must have passed a satisfactory examination in every one of the departments of dental instruction at regular periods of the College course.

The annual examinations will be conducted by a Board of Examiners. All candidates for admission are required before examination to produce certificates of good moral character, and students from other colleges are required to bring certificates from those colleges of honorable dismission. For admission they must present a degree in letters, science, or medicine from a recognized college or scientific school, or pass an examination in the following subjects:

1.—ENGLISH. Every candidate will be required to write legibly and correctly an English composition, and also to write English prose from dictation.

2.—PHYSICS. A competent knowledge of physics. (See Balfour Stewart's "Elements of Physics.")

Candidates from foreign countries must be able to speak the English language, and must present certificates of pupilage or length of practice, duly legalized by the authorities.

## FEES AND EXPENSES.

For Matriculation	- - - - -	\$5.00
For a year	- - - - -	100.00
For Demonstrator's Ticket (Anatomy)	- - - - -	5.00

There is no Diploma Fee, and no Fee for Graduation.

For further information, address

J. A. FOLLETT, M.D., Dean,  
219 Shawmut Avenue, Boston, Mass.

# INDIANA DENTAL COLLEGE,

## INDIANAPOLIS.

1887-8.

The regular term of the Indiana Dental College will begin Tuesday, 4th October, 1887, and will close in March, 1888.

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Superintendent of Dental Infirmary.

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JOHN N. HURTY, M.D., Professor of Chemistry, Materia Medica, and Superintendent of Chemical Laboratory.

THOMAS S. HACKER, D.D.S., Professor of Mechanical Dentistry, Oral Deformities, and Superintendent of Mechanical Laboratory.

### SPECIAL LECTURES OR CLINICS.

S. B. BROWN, D.D.S., Fort Wayne, Ethics of the Profession, Written and Unwritten.

MERIT WELLS, D.D.S., Indianapolis, Conduct of Dental Practice.

W. N. WILSON, D.D.S., Richmond, Pulpless Teeth, Putrescent Pulp, etc.

S. T. KIRK, D.D.S., Kokomo, Filling with Non-Cohesive Gold, Preparation of the Material before Filling, etc.

M. H. CHAPPELL, D.D.S., Knightstown, Oral Deformities, Irregularities of Teeth.

A. W. BRAYTON, M.D., Indianapolis, The Teeth of Fish, Reptiles, etc.

An ample corps of Demonstrators of Practical Dentistry will be supplied.

The students of this College will be admitted to the Clinical Lectures at the City Hospital throughout the term.

Arrangements have been made for Dental and Oral Surgery Clinics at the Hospital.

Good board near the College may be obtained for \$4.00 to \$5.00 per week, including rooms, fuel and light.

Tuition, Complete (one term) . . . . . \$100.00

No extras. All materials free.

For announcements or special information, address

J. E. CRAVENS, Secretary,

201 North Pennsylvania St.,

Indianapolis, Ind.

# NEW YORK COLLEGE OF DENTISTRY

## 1887-88.

### GOVERNING FACULTY.

FANEUIL DUNKIN WEISSE, M.D., Professor of Regional Anatomy and Oral Surgery.  
 FRANK ABBOTT, M.D., Dean of the Faculty, Professor of Operative Dentistry and Dental Therapeutics.  
 ALEXANDER WILLIAM STEIN, M.D., Professor of Visceral Anatomy, Physiology, and Histology  
 FRANK LEROY SATTERLEE, M.D., Ph.D., Professor of Chemistry and Metallurgy.  
 JAMES BOND LITTIG, D.D.S., Professor of Mechanical Dentistry.

### REGULAR SESSION LECTURERS.

FRANK W. JACKSON, M.D., Lecturer upon Anesthetics.  
 CARL HEITZMANN, M.D., Lecturer upon Dental Histology.  
 F. HASBROUCK, D.D.S., Lecturer upon Nitrous Oxide.

### ASSISTANTS.

SILAS C. BLAISDELL, M.D., DOMINGO M. SABATER, A.B., D.D.S., M.D., Assistants to the Chair of Regional Anatomy and Oral Surgery.  
 ALFRED R. STARR, M.D., D.D.S., Assistant to the Chair of Operative Dentistry and Dental Therapeutics.  
 Assistant to the Chair of Visceral Anatomy, Physiology, and Histology.  
 CHARLES E. H. PHILLIPS, D.D.S., Assistant to the Chair of Mechanical Dentistry.  
 W. TERRELL DAWSON, A.B., M.D., Assistant to the Chair of Chemistry and Metallurgy.

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 MARTIN C. GOTTSCHALDT, D.D.S., Lecturer upon Chemistry.  
 R. McLEAN SANGER, D.D.S., Lecturer upon Mechanical Dentistry.

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Students may matriculate at any time, as the Infirmary is open for regular students of the College to practice in the entire year.

The Regular Course of Lectures will commence on Monday, October 3, and continue until the first of March. The Spring Course will commence about the 15th of March, and continue until about the 1st of May. Three hours of each day of the week (except Saturday) will be devoted to Lectures, and four hours to Clinics and practice at the Chair and in the Laboratory under the direction of the Demonstrators.

With increased and greatly-improved accommodations in the Infirmary and Laboratory, we now offer to students most extensive and perfect practical facilities for acquiring an education.

### FEES.

Matriculation	\$5.00
Course of Lectures—Winter	100.00
Practical Course—Spring and Summer (Optional)	45.00
Graduation	30.00

Board may be obtained for from \$5 to \$8 per week.

For further information, address

FRANK ABBOTT, M.D., Dean,

22 West Fortieth Street, New York.





